MOORE INDUSTRIES

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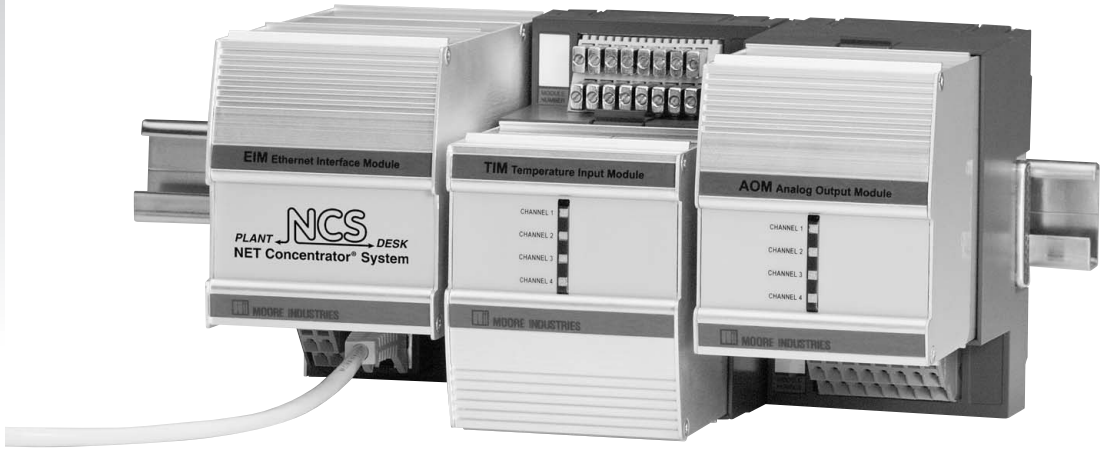
NET Concentrator® System with Ethernet Interface

NCS EIM



NCS EIM *NET Concentrator® System with Ethernet Interface*

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The NET Concentrator® System

This is the user's manual for the Moore Industries NET Concentrator® System (NCS), a modular family that provides a link between dispersed field-mounted process monitoring/control equipment and the control room. The NCS transports just a few, or hundreds, of process signals between the field or plant floor and your control room on a single communications network.

The NET Concentrator System is any combination of one Interface Module with one or more I/O modules. If there are multiple Interface Modules on one network, the individual Interface Modules are termed *stations*, while all the combined modules are called a *system*. If there is a single Interface Module on a network, it (and any attached I/O modules) is termed a *system*.

The Interface Module and one or more I/O modules connect together via DB-25 connectors located on the side(s) of each module. Any combination of input and output modules may be used within a NET Concentrator System network. Power for two input/output modules is supplied by the Interface Module. Up to eight additional units can be powered by adding a NET Concentrator System Power Module (CPM).

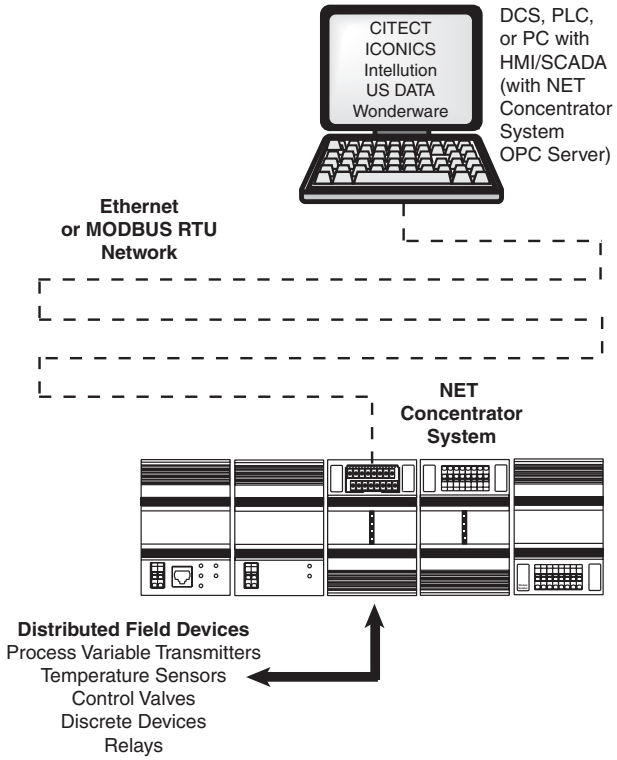
The EIM can support a total of 16 attached I/O modules. Two CPMs would be required to supply power to 16 modules.

About this Manual

Wherever you see a "***Note***", "***Caution***", or "***WARNING***" pay particular attention.

- A "***Note***" provides information to help you avoid minor inconveniences during calibration, installation or operation of the NCS.
- A "***Caution***" provides information on steps to take in avoiding procedures and practices that could risk damage to the NCS or other equipment.
- A "***WARNING***" provides information on steps to take in avoiding procedures and practices that could pose safety risks to personnel.

Figure 1. *The NET Concentrator System Connects a Variety of Field Devices to Your Controller*



The EIM Ethernet Interface Module

The Ethernet Interface Module (EIM) continuously scans the process variables and fault status of the connected I/O modules, storing this real-time data for access by the control system. The EIM also provides power for up to two I/O modules.

Note:

*The EIM Interface Module provides power for up to two I/O Modules. If more than two I/O Modules will be connected to the Interface Module, a CPM Concentrator Power Module is required. It works in conjunction with the EIM to power stations of up to eight I/O Modules. However, the CPM will only power units that are mounted to **its** left (from the user's front-view perspective, this would be the right side of the CPM).*

Figure 2. *NET Concentrator System stations consist of one EIM Interface Module combined with up to sixteen Input/Output Modules.*

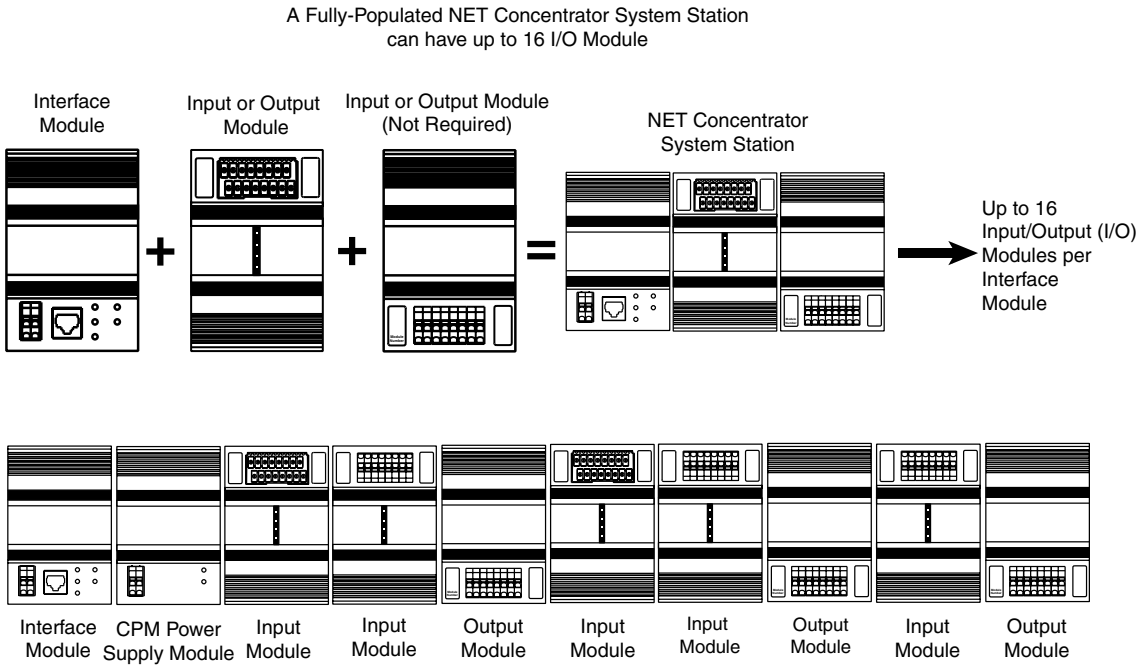
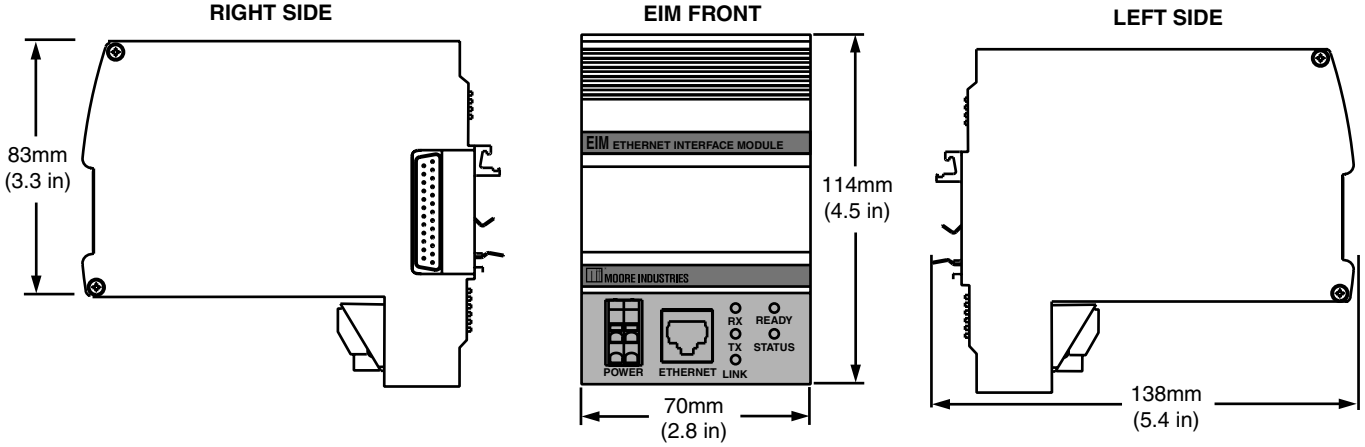


Figure 3. *EIM Dimensions*



Specifications

EIM Ethernet Interface Module

One Interface Module Required Per NET Concentrator System Station

Communications	**Ethernet Port:** 10/100Base-T supports speeds up to 100Mb/sec. **Ethernet Connection Type:** Standard RJ-45 **Protocol Type:** MODBUS/TCP
Performance	**Data Access Time:** Time to detect or effect a change in an I/O signal from a MODBUS master polling a NET Concentrator System station is the sum of 3 timing components: 1. Network Communication Time: Depends on network architecture and traffic. For a PC locally networked to an NCS station, this time is negligible 2. Scan Time: Time required by the EIM to scan real-time data in all I/O modules within an NCS station (see "Module Scan Time" specification for each I/O module type and add times for each I/O module in the NCS station) 3. Signal Response Time: Time to convert between physical I/O and digital signals (see specification for specific I/O type)
Performance (continued)	**OPC Server:** Allows PC-based software packages to access data from the Ethernet Interface Module; Upon initiation, automatically polls the local intranet, and automatically identifies available I/O modules and individual channel tagnames **Isolation:** 500Vrms, continuous, and will withstand 1000Vrms dielectric strength test for one minute with no breakdown, between power input, Ethernet port, case and terminals of other attached NCS modules **Power Supply:** 20-30Vdc/3.5W maximum **Diagnostic Data:** Refer to Appendix D, Table A-3
Status and Fault Indicators	**READY:** Green LED indicates the device has initialized and is running properly **STATUS:** Red/Green LED, normally green, turns red when fault conditions within the EIM are detected **LINK:** Green LED indicates a network link is present
Status and Fault Indicators (continued)	**RX (Receive Status):** Green LED flashes as information is received **TX (Transmit Status):** Green LED flashes as information is transmitted
Data Logger	Records up to 64,000 time-stamped data points; 1000 data points (18,000 with 512k BBRAM option) held in battery backed RAM (BBRAM); minimum sample period, 100msec; maximum sample period, 24 hours; Real Time Clock (RTC) with non-volatile memory time-stamp data; measurement parameters are software configurable
Ambient Conditions	**Operating Range:** –40°C to +85°C (–40°F to +185°F) **Storage Range:** –40°C to +85°C (–40°F to +185°F) **Relative Humidity:** 0-95%, non-condensing **RFI/EMI Protection:** 20V/m @20-1000MHz, 1kHz AM when tested according to EN61000-4-3-1996 **Shock and Vibration:** As defined by SAMA PCM 31.1, field mounted category
Weight	493 g (17.4 oz)

Specifications and information subject to change without notice.

Connecting the EIM to the Network

Connecting the EIM to the Ethernet network involves *Making the Connections* and *Configuring the EIM Web Server.* To access real-time data using Modbus commands instead of the web server, see *Appendix D: MODBUS/TCP Support.*

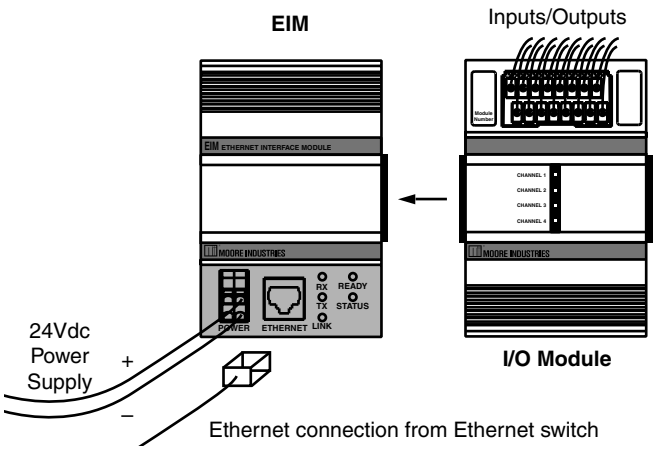
Mounting

The EIM is designed to snap easily onto 32mm, G-type (EN50035) or 35mm Top Hat (EN50022) DIN-rails. Snap the EIM onto the DIN-rail, then snap additional NCS modules onto the DIN-rail to the right of the EIM, and slide together until the DB25 connectors on the side of the EIM connect completely with the unit to its right.

Making the Connections

The EIM requires only three basic connections: power, communication, and input (see Table 1). Connect a 24Vdc power source, an Ethernet cable connected to your network, and I/O modules as shown in Figure 4.

Figure 4. *NET Concentrator System Connection Diagram*



To install the power supply into the terminals, insert a small, flathead screwdriver into the pry slot, open wire terminal and place wire. The wire gauge requirement for NCS system modules is 12-28AWG.

Network Connection

Install the EIM onto your Ethernet process network using a cat 5 cable with an RJ-45 connector to connect the EIM to an Ethernet switch or hub.

Note:

Hubs allow all network traffic through. This can overwhelm connected process instruments on a heavily utilized network. Switches allow only broadcasts and traffic directed to attached devices. It is recommended that switches be used in process networks, instead of hubs.

CE Conformity

Installation of any Moore Industries' product that carries the CE compliance marking (Commission Electrotechnique) must adhere to their respective installation guidelines in order to meet the requirements set forth in applicable EMC (Electromagnetic Compatibility) directive (EN61326). Consult the factory for additional information.

Table 1. *Necessary Equipment Table*

Device	Description
Ethernet Network Connection	10/100 Base-T UTP
Power Supply	24Vdc
Personal Computer	IBM or compatible PC with: 20Mb free hard disk space Microsoft Windows® 95, 98, 2000, ME, or NT and Internet Explorer 5.0+ with Javascript 1.1 or later. Available network connection (Windows 98, 2000, ME and NT may require additional RAM and hard disk space. See your Windows manual for details.)

Recommended Ground Wiring Practices

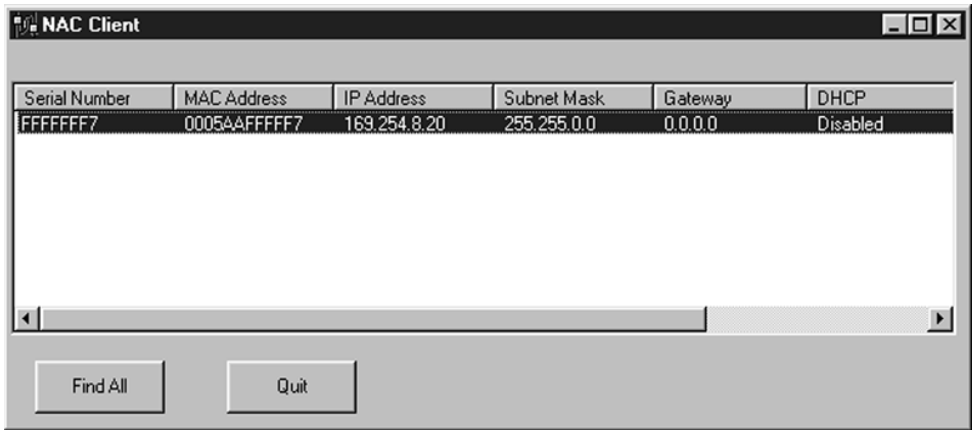
Moore Industries recommends the following ground wiring practices:

- Any Moore Industries product in a metal case or housing should be grounded.
- The NCS individual module bases are mechani cally grounded when installed onto the DIN-rail. Be sure the DIN-rail is connected to a system safety earth ground before making any other con nections.
- With the exception of the Ethernet connection, which may use an unshielded, twisted pair, all input signals to, and output signals from, Moore Industries' products should be wired using a shielded, twisted pair technique. Shields are to be connected to an earth or safety ground at one end only.
- The maximum length of unshielded input and output signal wiring should be 2 inches.

Power Sourcing Parameters for General Locations, Intrinsically Safe, and Non-Incendive/Type N applications

In accordance with IEC 1010.1 Annex H (all models), the input terminals must be connected to and/or supplied from a certified energy limiting Class 2 or a Separate Extra Low Voltage (S.E.L.V.) power supply separated from all mains by double/reinforced insulation.

Figure 5. *NAC Client Software Screen*



Note:
If the EIM started using DHCP, the network address information displayed in the list box is how the server is currently configured. When you double click to open the "Edit" window, the network settings boxes are disabled. You cannot set the IP address, subnet mask, or gateway address manually if the server is using DHCP.

Configuring Network Settings

The EIM has a Web Server that is used for configuring the NET Concentrator System of products. To setup your NCS properly, you must configure your EIM for your local area network (LAN). Our Network Address Configuration (NAC) Client software will help you configure the EIM properly. Begin by installing the NAC Client software onto your PC.

Installing the NAC Client Utility

To install the software, insert the EIM CD into the CD drive of a Windows equipped PC. Open the CD and run the *Moore NAC* program, then use the setup program to install the NAC Client. The setup program may require you to upgrade certain Windows components before it will install.

Fixed Network Settings or DHCP

To use the EIM on a given Ethernet network, three settings must be configured–IP address, gateway and subnet mask. The EIM comes with DHCP (dynamic host configuration protocol) enabled, allowing the network settings to be acquired automatically when the EIM is connected to a network with a DHCP server. If connected to a network without a DHCP server, fixed network settings must be configured in the EIM.

Caution:
The use of DHCP introduces the possibility of change or loss of IP address, caused by DHCP server outages or configuration particulars, or by an untimely power outage to the EIM (i.e., coincident with DHCP lease expiration). Use of fixed network settings in the EIM avoids these potential problems.

To access the network settings of an EIM, run the NAC client on a PC connected to the same network as the EIM or, if no network is available, connect a cross-over cable between the Ethernet ports of the EIM and PC.

Start the NAC client by clicking on the icon in the *Start Menu*. Once the program is running, click *Find All*, refer to Figure 5 for a view of the NAC Client Software screen. If more than one EIM is on the network, the NAC Client will list them all. Disconnect the network cable from the EIM in question, click *Find All* again and determine which EIM disappeared from the list.

To change the network settings for a station, double click on the station that you want to change. This will open a second window where you can view and change all network settings. Click *OK* when you are finished.

The station will change the settings and respond with a message indicating that the system will reboot in 10 seconds. If you receive an error, you may have not specified the correct username and password or have an incorrect setting in the network window. Note that the new settings do not appear in the NAC utility list window. To view the new network settings, click *Find All* in the NAC utility after the system is rebooted.

Connecting to the EIM Station

Once the EIM station is configured for your network, you can use a web browser to test the station. Open Internet Explorer and type the IP address of the station into the URL bar. Using the example from Figure 5, you would type *http://169.254.8.20*.

If the station is in *Open* security mode, the Home page will appear. If the station is in *Closed* mode, you must supply an account name and password to access the web pages, and an administrator-level account is required to change network settings.

Note:
The EIM has a default security setup of Open; no password is required to access any levels of the software.

You can also connect to the station using a FTP client tool. Simply open a FTP connection to the station using its IP address as the site address. The same username and passwords apply as for the web server. However, the default *guest* account does not have FTP access so only the *root* account (default password of *password*) can successfully connect using FTP.

EIM Web Server and Configuration Software

The EIM contains its own configuration program in the form of an embedded web server. Pages can be accessed using your Ethernet connection and an Internet browser. For directions, refer to *Connecting the EIM to the Network.* The Web Server contains these sections (as shown in Figure 6):

1. Home Page–This page is the NCS Interface Module Home Page. On it, you will find all the options you will need to configure your system. For quick reference, fault messages are listed on the home page.

2. Process Status–This screen continuously monitors and displays the activity of a selected I/O module, updating its display as frequently as every five seconds.

3. I/O Modules–This web page allows you to change the settings of the different modules attached to the Interface Module. For example, if you have a TIM attached, this screen will permit you to change the measurement type, input range, and other measurement parameters. Select the appropriate module and channel, adjust the parameters, then press *Commit* to transfer the configuration to the Interface Module.

4. Interface Module–The *Interface Module* pages include a number of selections that provide all the necessary options for setting the system parameters of the Interface Module.
a. System Information–Lists the EIM server information and displays the amount of storage space left in the EIM.
b. System Time–Displays the current system (EIM) time and allows you to manually set the time, use the time of the PC viewing the web page (workstation) and enable the EIM to use a network time server, by entering the time server's IP address. The time server must be SNTP compatible.
c. Modbus–This determines how a MODBUS system responds to the longer (32-digit) data strings. It will either read the first 16 digits, then the second 16 digits, or vice versa. If the floating point data displayed on your MODBUS Master appears incorrect, switch the floating point word order.

d. Web Data Display–Allows you to view, and change, the rate at which the web server updates information (*Update Rate)* and the resolution of displayed numeric data (*Precision)*. Select the desired value in the appropriate parameter and click the *Update* button.
e. ISaGRAF–The ISaGRAF page of the interface module allows you to start or stop ISaGRAF and also to verify whether status is *Running* or *Stopped*. This enables you to temporarily disable any logic that is controlling the I/O modules so that you may perform loop test and trimming functions in the AOM and ROM modules.

5. Data Logger–The *Data Logger* screen allows you to manipulate the data log of the Interface Module. It resides in RAM and is a circular buffer (first in; first out). The Data Log records input information at a selected interval from specified input channel(s). It effectively maintains a running log of the last T seconds (or minutes or hours) of data where T = Sample Period x Maximum Records per channel.

From the *Data Logger* page, you can surf to web pages where you can configure the data logger, view the data logger status, or view the data logger files.

a. Configure Data Logger–This page is used to select channels to be logged, sample period and data log size in terms of maximum records per channel (a total of 64,000 records, from all channels, may be stored). You can also pre-configure the logger to start automatically upon power up or to remain inactive following power up. After editing these settings, commit the configuration by clicking the *Update* button, to transfer the configuration to the Interface Module, and then start the data logger by clicking *Start.*
b. View Logger Status–Lists the health and specifications (current number of records, and status message) of the data logger. You may view whether the logger is running or stopped.
c. View Data Log–Allows you to view actual time-stamped data for each sample. Refer to *Appendix A: Configuring the Data Logger* for details.

To save the data log to your hard drive, return to the *Configure Data Logger* page and click *Stop* to stop the logger. Then, click the *Save Data Log Locally* link. Follow the pop-up dialog to name and save the data log as a file. The file format is .csv (comma separated value) and can be opened using Microsoft Excel®.

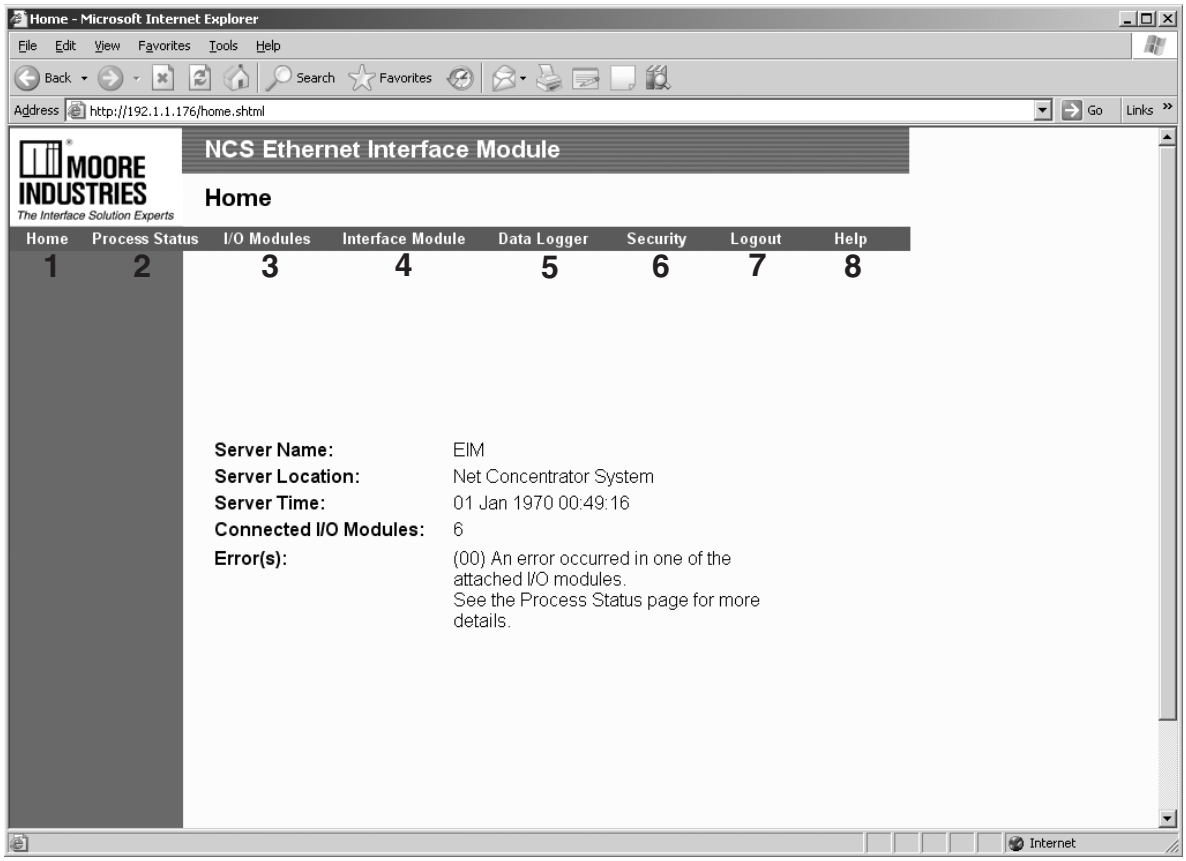
6. Security–The *Security* page includes a number of selections that provide all the necessary options for setting the security of the Interface Module. For more information on how to setup user accounts and change access privileges, see *Appendix C: NCS Security Overview*.

a. User Accounts–Enables you to set the ability of each user to access various pages of the Net Concentrator program, modify passwords, and read or write using a FTP program.
b. Change Password–The screen where users change their logon password.
c. Security Mode–Changes the security from *Open*, where passwords are unnecessary, to *Closed*, where passwords are enforced. Refer to *Appendix C: NCS Security Overview* for details.

7. Logout–Logging Out ends your session.

8. Help–Connects you to the help system.

Figure 6. *The EIM Web Server is used to set the parameters of each attached NCS module*


Home - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://192.1.1.176/home.shtml
Go Links
MOORE INDUSTRIES
The Interface Solution Experts
NCS Ethernet Interface Module
Home
Home Process Status I/O Modules Interface Module Data Logger Security Logout Help
1 2 3 4 5 6 7 8
Server Name: EIM
Server Location: Net Concentrator System
Server Time: 01 Jan 1970 00:49:16
Connected I/O Modules: 6
Error(s): (00) An error occurred in one of the attached I/O modules.
See the Process Status page for more details.
Internet

The TIM Temperature Input Module

The Temperature Input Module (TIM) of the NCS family isolates and conditions up to four temperature signals and relays temperature information from these inputs to the Interface Module.

Installing the TIM

Installation consists of physically mounting the unit, completing the input connections, and grounding the unit.

Mounting

The TIM is designed to snap easily onto 32mm, G-type (EN50035) or 35mm Top Hat (EN50022) DIN-rails. Snap the TIM onto the DIN-rail to the right of the NCS module, then slide it along the rail until the DB25 connectors on the side of the TIM connect completely with the unit to its left. See Figure 7 for illustration.

Recommended Ground Wiring Practices

Moore Industries recommends the following ground wiring practices:

- Any Moore Industries product in a metal case or housing should be grounded.
- The NCS individual module bases are mechanically grounded when installed onto the DIN-rail. Be sure the DIN-rail is connected to a system safety earth ground before making any other connections.
- All input signals to, and output signals from, Moore Industries' products should be wired using a shielded, twisted pair technique. Shields are to be connected to an earth or safety ground near the unit itself.
- The maximum length of unshielded input and output signal wiring should be 2 inches.

Input Connections

After mounting, you are ready to connect the inputs to the TIM. Since the TIM receives power from the connected Interface Module, only the temperature sensor inputs need to be connected. Figure 7 shows the connection diagrams for the TIM. The wire gauge requirement for NCS system modules is 12-28AWG.

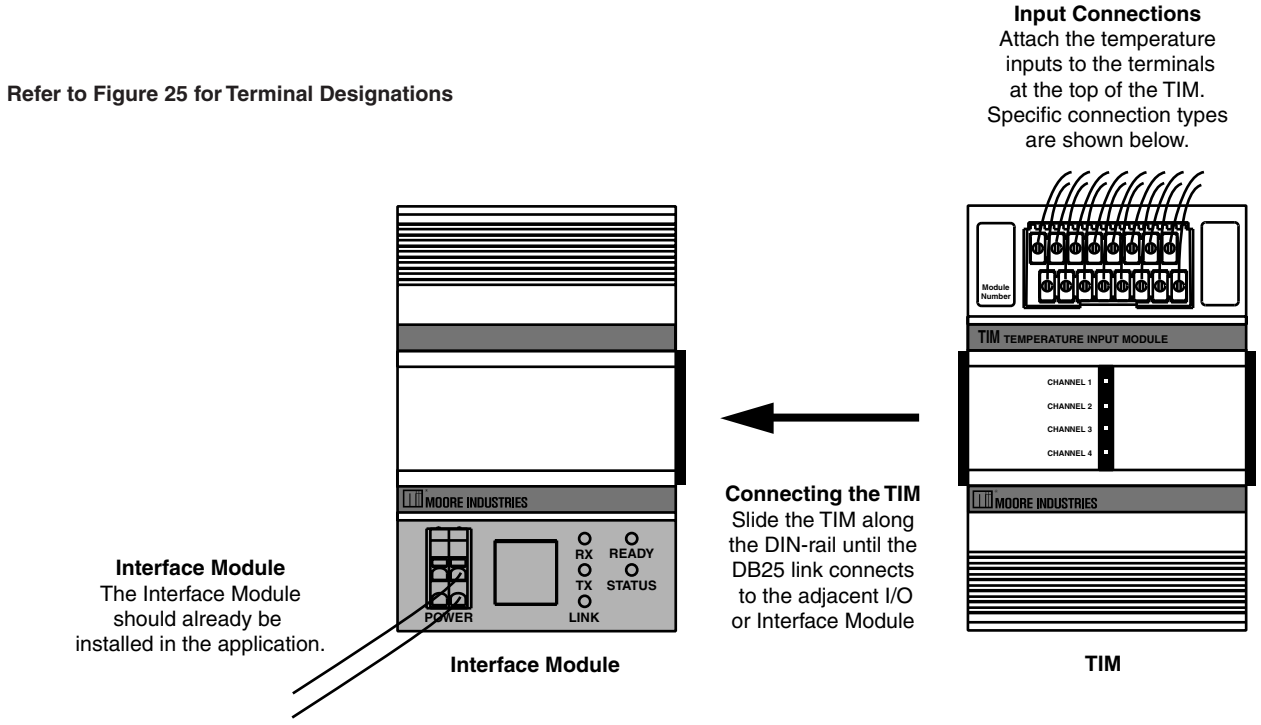
"Hot Swapable" I/O Modules

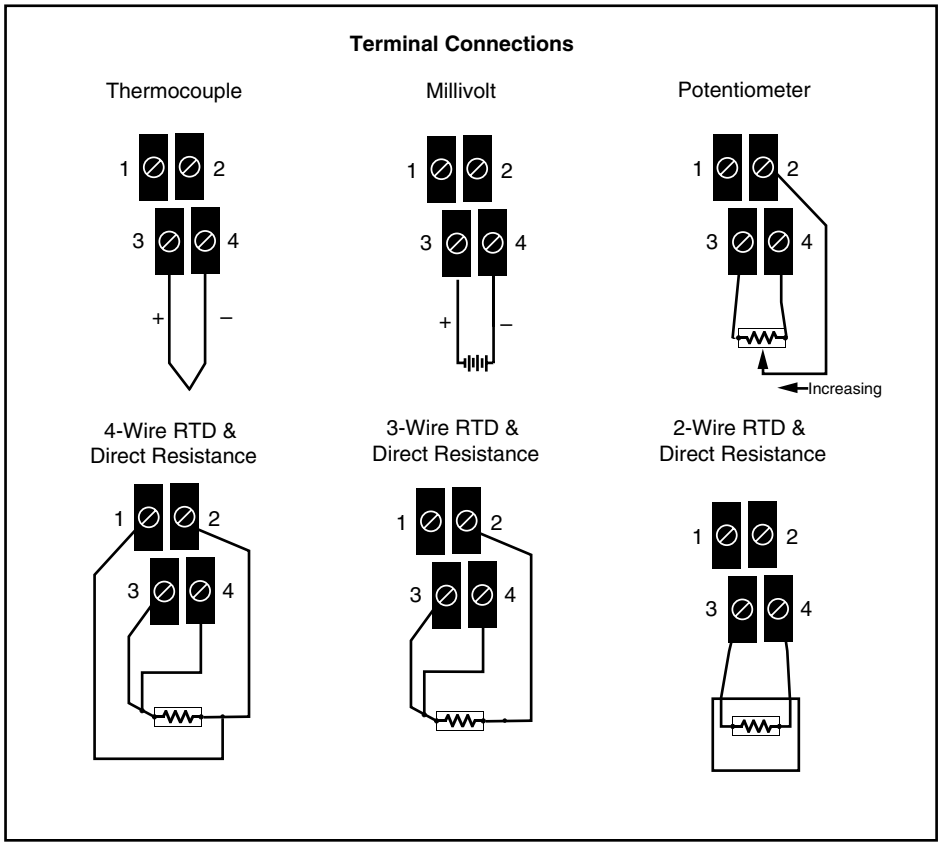
Should an Input/Output Module need to be replaced, simply program a new module, remove the old module from the mounting base and snap in the new one. For more specific instructions, see *Appendix F: Hot-Swapping a NET Concentrator Module*.

CE Conformity

Installation of any Moore Industries' product that carries the CE compliance marking (Commission Electro technique) must adhere to their respective installation guidelines in order to meet the requirements set forth in applicable EMC (Electromagnetic Compatibility) directive (EN61326). Consult the factory for additional information.

Figure 7. *TIM Connection Diagram*





Configuring the TIM

The TIM is configured using the web server contained within the connected Interface Module. To configure the TIM, you must first mount it to the Interface Module as described in *Installing the TIM*. To access real-time data using modbus commands instead of the web server, see *Appendix D: MODBUS/TCP Support.*

After mounting, bring up the NCS configuration software by starting an Internet browser on a computer attached to the same network as the NCS, and typing *http://* followed by the IP address that the Moore Industries' NAC Client software lists for your Interface Module.

Once you have accessed the NCS configuration software, click on *I/O Module*, then *Configure Temperature Input Module.* This will display the screen shown in Figure 8. Configure the parameters listed on the screen, and when you are finished, press *Commit*.

Current Channel
The TIM accepts four different temperature inputs, and uses a separate channel for each. Select the channel you wish to program.

Channel Disabled
Checking this box will cause the TIM and its associated Interface Module to ignore the selected channel, allowing you to use less than all four channels without receiving error messages.

Tag Name
Assign tag names, or descriptors, to process variables. The *Process Status* page will display the data next to the respective process variable tag. These tags can also be read by the EIM OPC Server and can therefore be used to access process data in the EIM when configuring an OPC client.

Input Configuration
This programs the type of input that the TIM will receive. Different measurement types require different parameters to be programmed. When a measurement type is selected, other parameters may become red, indicating that these parameters must be programmed.

Input Ranging
Allows you to either input or capture the upper and lower ranges that you want to have measured.

Ambient Temperature
Checking this box causes the TIM to measure the temperature at the Reference Junction Compensation (RJC) sensor and causes the attached Interface Module to scan this value from the TIM. The temperature is stored in a modbus register titled *Ambient Temperature* and cannot be accessed through the web server. To access this register, refer to *Appendix D MODBUS/TCP Support.*

File Management
If you will be using a common configuration within your NCS system, you can create a configuration and save it to a file so that you can load it into your next channel or module. Refer to *Appendix G: File Management* for details.

Broken Wire Detection
Checking this causes the TIM to perform continuous sensor diagnostics, monitoring the sensor and sending the output upscale or downscale during a failure.

PV Input On Failure
Select how your input value reacts upon a failure. Selecting *Hold Last* maintains the value last read before the failure. To display a user-selected value, click the *Preset* button and then enter the value into the *Predefined Value* text box. The unit displayed will depend upon the *Input Type* that you have chosen.

Input Scaling
Input Scaling allows you to take the input and convert it to a different range. For example, you take a channel with a 0-1000°C range and scale it to 0-100°C; now when the input is 734°C, it is relayed to the Interface Module as 73.4°C.

Custom Curve
The Custom Curve box allows you to setup a custom linearization table of up to 128 points that will tell the TIM what value to output when a certain input is received. This is accomplished by loading into memory a *comma-separated value* file (.csv) that was created in Excel® or a similar program. Refer to *Appendix E* for instructions on loading a custom curve file.

Note:
Enable Scaling if Custom Curve is to be used. Szero and Sfull must be set to curve Y First and Last. If scaling will also be used, simply use the desired range for Szero and Sfull.

Custom Engineering Units
The I/O configuration web pages allow you to customize the process variable engineering units (EGU). The data can then be viewed on the *Process Status* page with the correct units.

Sensor Trimming
The TIM can be trimmed with two data points within the selected zero and span measurement range. This allows a complete range to be monitored, while placing a measurement emphasis on the most critical segment of the process range.

Follow the steps below trim your instrument.

1. Select the channel you wish to trim; click the *Trim / Enable* link on the associated web page.

2. Click the *Trimming enabled* checkbox. Depending on your function, select *1 point trim* or *2 point trim*.

3. To trim the lower point, enter the value that you would like displayed as your process variable (PV) into the *Lower* text box. Input that value into the TIM using your input device.

4. Click the *Trim Lower* buttton. This will bring up a pop-up window to input the value that you entered as your lower trim point; click *Accept* if you are satisfied with the data received by the TIM.

The captured value will update to this value on the *Analog Input Trimming* screen.

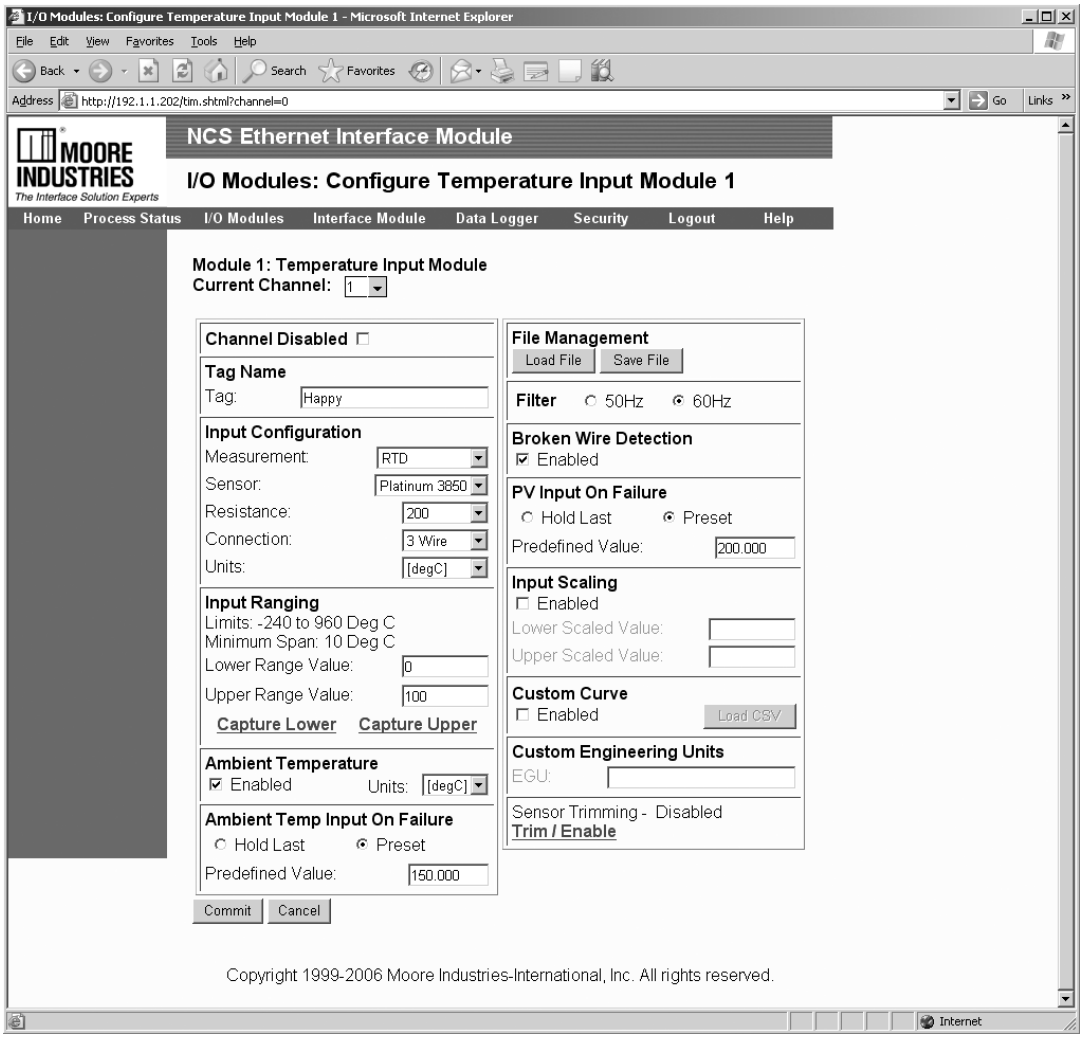
5. If performing 2 point trimming, repeat Steps 4 and 5 for the upper trim point.

6. Click *Submit* to save the trimming values and continue to the next channel.

Repeat these steps for each channel that requires trimming.

Commit/Cancel Buttons
Click *Commit* when you are finished selecting parameters to save the settings to memory. *Cancel* ends your configuration without saving changes.

Figure 8. *TIM Configuration Web Page*



Specifications

TIM Temperature Input Module (4 Channels)
(Up to Eight Per Interface Module)

Performance	**Input Ranges:** See Table 2 **Accuracy:** See Table 2 **Reference Junction Compensation Accuracy:** ±0.25°C **Input Resolution:** 20-bit **Stability (% of max. span):** RTD: 1-year, 0.013%; 3-year, 0.023%; 5-year, 0.029% Thermocouple: 1-year, 0.0084%; 3-year, 0.015%; 5-year, 0.019% **Isolation:** 500Vrms, continuous, from channel to channel, from each channel to case, and from each channel to terminals of other attached NCS modules; will withstand 1000Vrms dielectric strength test for one minute, with no breakdown, from each channel to case, and from each channel to terminals of other attached NCS modules **Scan Time:** The time required for the Interface Module to access process variable and status data from all four channels of the TIM is 16ms	**Performance (continued)**	**Response Time:** 150ms **Input Impedance (T/C):** 40Mohms, nominal **Maximum Input Overrange:** ±5Vdc peak, maximum **Excitation Current (RTD and Ohms):** 250 microamps nominal **Power Supply:** Power is supplied by the Interface Module, 1.5W maximum **Linearization Capability:** Custom curve tables can be configured with up to 128 points using Internet Explorer web pages or PC-based software **Input Filter:** Programmable for 50 or 60Hz noise rejection **Diagnostic Information:** Refer to Appendix D, Table A-6	**Ambient Conditions**	**Operating Range:** –40°C to +85°C (–40°F to +185°F) **Storage Range:** –40°C to +85°C (–40°F to +185°F) **Ambient Temperature Effect:** See Table 1 **Effect on Reference Junction Compensation:** ±0.005°C/°C **Relative Humidity:** 0-95%, non-condensing **RFI/EMI Immunity:** 20V/m @20-1000MHz, 1kHz AM when tested according to ENC6100-4-3-1996; Effect on RTD/Ohms Input: 0.4°C/0.1 ohms, maximum; Effect on Thermocouple/Millivolt Input: 1.0°C/40 microvolts, maximum **Common Mode Rejection:** 100dB@50/60Hz **Normal Mode Rejection:** 50dB typical@0.2V peak-to-peak, 50/60Hz
		Status and Fault Indicators	One red/green LED per channel indicates proper channel operation (green) or that the channel is in a fault condition (red)	**Weight**	589 g (20.7 oz)

Specifications and information subject to change without notice.

Figure 9. *TIM Dimensions*

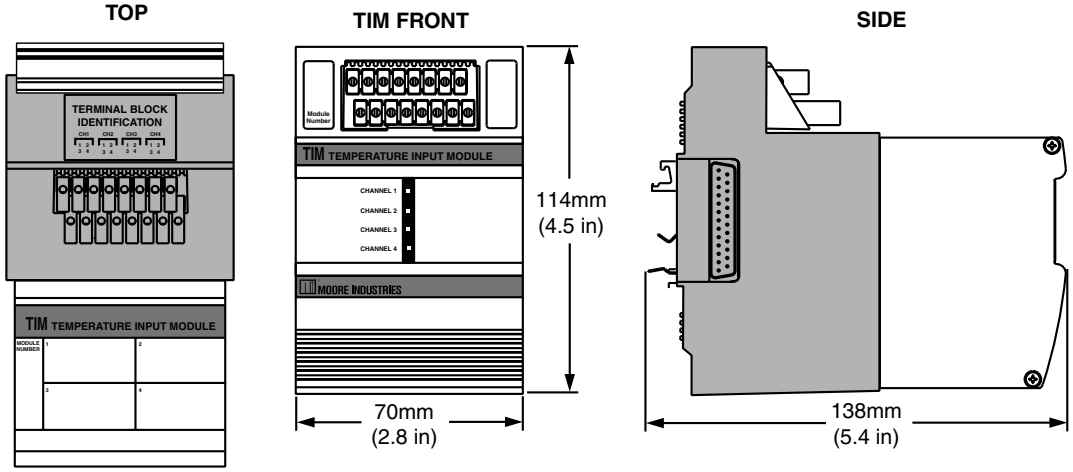


Table 2. *TIM Temperature Input Type and Accuracy Table*

Input	Type	α	Ohms	Conformance Range	Minimum Span	Input Accuracy	Maximum Range	Ambient Temperature Accuracy/°C Change
RTD (2-, 3-, 4-Wire)	**Platinum**	0.003850	100	-200 to 850°C -328 to 1562°F	10°C (18°F)	±0.1°C (±0.18°F)	-240 to 960°C -400 to 1760°F	0.0035°C (0.0063°F)
			200					
			300					
			400					
			500					
			1000					
		0.003902	100	-100 to 650°C -148 to 1202°F			-150 to 720°C -238 to 1328°F	
			200					
			400					
			500					
			1000					
		0.003916	100	-200 to 510°C -328 to 950°F			-240 to 580°C -400 to 1076°F	
	Nickel	0.00672	120	-80 to 320°C -112 to 608°F		±0.14°C (±0.25°F)	-100 to 360°C -148 to 680°F	0.002°C (0.0036°F)
	Copper	0.00427	9.035	-50 to 250°C -58 to 482°F		±1.6°C (±2.88°F)	-65 to 280°C -85 to 536°F	0.0035°C (0.0063°F)
Ohms	**Direct Resistance**	n/a	0-4000 ohms	0-4000 ohms	10 ohms	±0.4 ohms	0-4095 ohms	0.002 ohms + 0.005% of reading
	Potentiometer		100-4000 ohms	0-100%	10%	±0.1%	0-100%	
T/C	**J**	n/a	n/a	-180 to 760°C -292 to 1400°F	35°C (63°F)	±0.25°C (±0.45°F)	-210 to 770°C -346 to 1418°F	0.00016°C + 0.005% of reading
	K	n/a	n/a	-150 to 1370°C -238 to 2498°F	40°C (72°F)	±0.3°C (±0.54°F)	-270 to 1390°C -454 to 2534°F	0.0002°C + 0.005% of reading
	E	n/a	n/a	-170 to 1000°C -274 to 1832°F	35°C (63°F)	±0.25°C (±0.45°F)	-270 to 1013°C -454 to 1855.4°F	0.00026°C + 0.005% of reading
	T	n/a	n/a	-170 to 400°C -274 to 752°F	35°C (63°F)	±0.25°C (±0.45°F)	-270 to 407°C -454 to 764.6°F	0.0001°C + 0.005% of reading
	R	n/a	n/a	0 to 1760°C 32 to 3200°F	50°C (90°F)	±0.55°C (±0.99°F)	-50 to 1786°C -58 to 3246.8°F	0.00075°C + 0.005% of reading
	S	n/a	n/a	0 to 1760°C 32 to 3200°F	50°C (90°F)	±0.55°C (±0.99°F)	-50 to 1786°C -58 to 3246.8°F	0.00075°C + 0.005% of reading
	B	n/a	n/a	400 to 1820°C 752 to 3308°F	75°C (135°F)	±0.75°C (±1.35°F)	200 to 1836°C 392 to 3336.8°F	0.0038°C + 0.005% of reading
	N	n/a	n/a	-130 to 1300°C -202 to 2372°F	45°C (81°F)	±0.4°C (±0.72°F)	-270 to 1316°C -454 to 2400.8°F	0.0003°C + 0.005% of reading
	C	n/a	n/a	0 to 2300°C 32 to 4172°F	100°C (180°F)	±0.8°C (±1.44°F)	0 to 2338°C 32 to 4240.4°F	0.00043°C + 0.005% of reading
mV	**DC**	n/a	n/a	-50 to 1000mV	4 mV	15 microvolts	n/a	0.5 microvolts + 0.005%

The AIM Analog Input Module

The Analog Input Module (AIM) of the NCS family isolates and conditions four analog signals and relays input information to the Interface Module.

Installing the AIM

Installation consists of physically mounting the unit, completing the input connections, and grounding the unit.

Mounting
The AIM is designed to snap easily onto 32mm, G-type (EN50035) or 35mm Top Hat (EN50022) DIN-rails. Snap the AIM onto the DIN-rail to the right of the NCS unit, then slide it along the rail until the DB25 connectors on the side of the AIM connect completely with the unit to its left. See Figure 10 for illustration.

Recommended Ground Wiring Practices
Moore Industries recommends the following ground wiring practices:

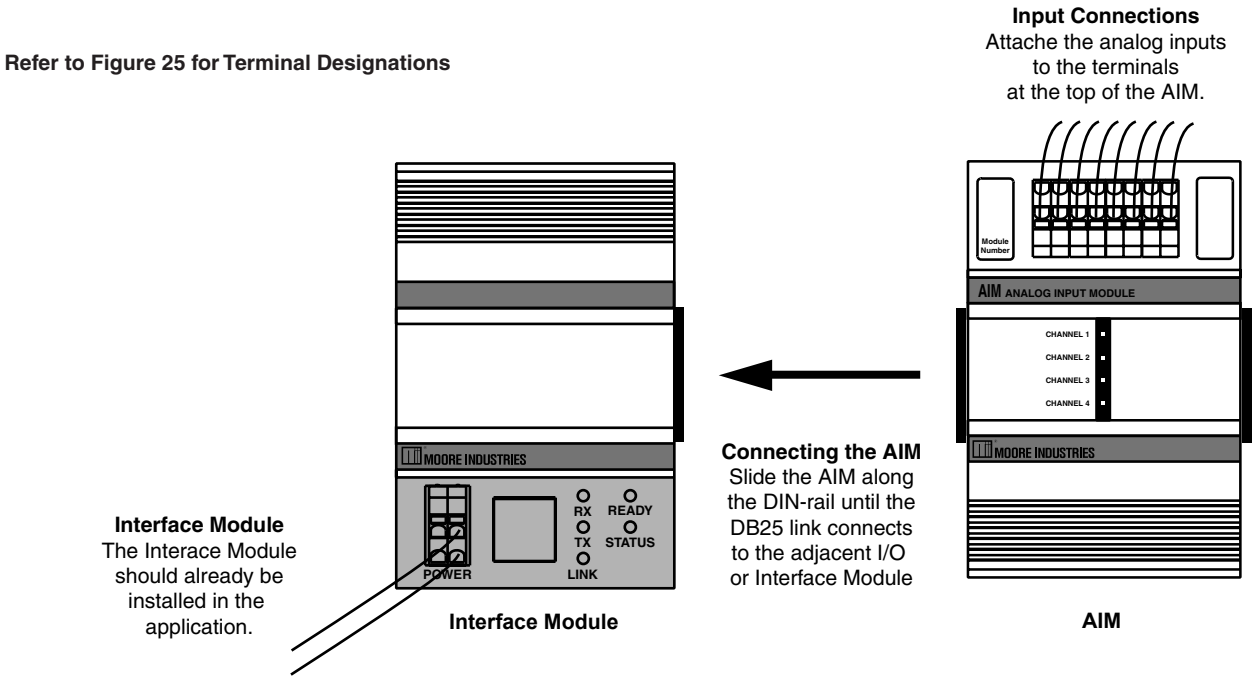
- Any Moore Industries product in a metal case or housing should be grounded.
- The NCS individual module bases are mechanically grounded when installed onto the DIN-rail. Be sure the DIN-rail is connected to a system safety earth ground before making any other connections.
- All input signals to, and output signals from, Moore Industries' products should be wired using a shielded, twisted pair technique. Shields are to be connected to an earth or safety ground near the unit itself.
- The maximum length of unshielded input and output signal wiring should be 2 inches.

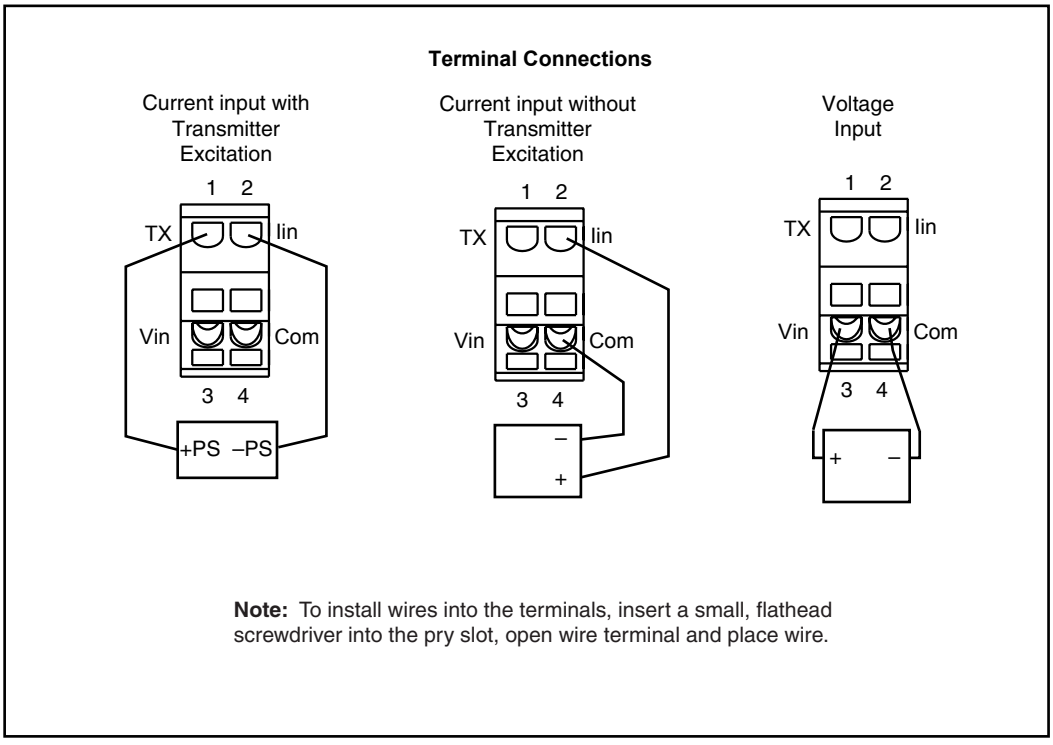
Input Connections
After mounting, it is time to connect the analog inputs to the AIM. Since the AIM receives power from the connected Interface Module, only the analog inputs need to be connected. Figure 10 shows the connection diagrams for an AIM. The wire gauge requirement for NCS system modules is 12-28AWG.

"Hot Swapable" I/O Modules
Should an Input/Output Module need to be replaced, simply program a new module, remove the old module from the mounting base and snap in the new one. For more specific instructions, see *Appendix F: Hot-Swapping a NET Concentrator Module*.

CE Conformity
Installation of any Moore Industries' product that carries the CE compliance marking (Commission Electro technique) must adhere to their respective installation guidelines in order to meet the requirements set forth in applicable EMC (Electromagnetic Compatibility) directive (EN61326). Consult the factory for additional information.

Figure 10. *AIM Connection Diagram*





Note: To install wires into the terminals, insert a small, flathead screwdriver into the pry slot, open wire terminal and place wire.

Configuring the AIM

The AIM is configured using the web server contained within the Interface Module it is attached to. To configure the AIM, you must first mount it to the Interface Module as described in *Installing the AIM*. To access real-time data using modbus commands instead of the web server, see *Appendix D: MODBUS/TCP Support.*

After mounting, bring up the NCS configuration software by following the instructions described in the *Connecting to the EIM Station* section of this manual.

Once you have accessed the NCS configuration software, click on *I/O Module*, then *Configure Analog Input Module.* This will display the screen shown in Figure 11. Configure the parameters listed on the screen, and when you are finished, press *Commit*.

Current Channel
The AIM accepts four different analog inputs, and uses a separate channel for each. Select the channel you wish to program.

Channel Disabled
Checking this box will cause the AIM and its associated Interface Module to ignore the selected channel, allowing you to use less than all four channels without receiving error messages.

Tag Name
Assign tag names, or descriptors, to process variables. The *Process Status* page will display the data next to the respective process variable tag. These tags can also be read by the EIM OPC Server and can therefore be used to access process data in the EIM when configuring an OPC client.

Input Type
This sets the type of input that the AIM will receive. Different measurement types require different parameters to be programmed. When a measurement type is selected, other parameters may become red, indicating that the red parameter must be programmed.

Input Ranging
Allows you to either input or capture the upper and lower ranges that you want to have measured.

Filter
This setting is used to configure the input filter. The filter is designed to reduce the effects of mains-induced noise. The input filter frequency value should be set to the frequency of the local AC supply–either 50Hz or 60Hz.

File Management
If you will be using a common configuration within your NCS system, you can create a configuration and save it to a file so that you can load it into your next channel or module. Refer to *Appendix G: File Management* for details.

Input On Failure
Select how your input value reacts upon a failure. Selecting *Hold Last* maintains the value last read before the failure. To display a user-selected value, click the *Preset* button and then enter the value into the *Predefined Value* text box. The unit displayed will depend upon the *Input Type* that you have chosen (MilliAmps or Volts).

Input Scaling
Input Scaling allows you to take the input and convert it to a different range. For example, you take a channel with a 0-10V range and scale it to 0-100V; now when the input is 7.34V, it is relayed to the Interface Module as 73.4V.

Custom Curve
The Custom Curve box allows you to setup a custom linearization table of up to 128 points that will tell the AIM what value to output when a certain input is received. This is accomplished by loading into memory a *comma-separated value* file (.csv) that was created in Excel® or a similar program. Refer to *Appendix E* for instructions on loading a custom curve file.

Note:
Enable Scaling if Custom Curve is to be used. Szero and Sfull must be set to curve Y First and Last. If scaling will also be used, simply use the desired range for Szero and Sfull.

Custom Engineering Units
The I/O configuration web pages allow you to customize the process variable engineering units (EGU). The data can then be viewed on the *Process Status* page with the correct units.

Sensor Trimming
The AIM can be trimmed with two data points within the selected zero and span measurement range. This allows a complete range to be monitored, while placing a measurement emphasis on the most critical segment of the process range.

To perform sensor trimming, follow the steps below.

1. Select the channel you wish to trim; click the *Trim / Enable* link on the associated web page.

2. Click the *Trimming enabled* checkbox. Depending on your function, select *1 point trim* or *2 point trim*.

3. To trim the lower point, enter the value that you would like displayed as your process variable (PV) into the *Lower* text box. Input that value into the AIM using your input device.

4. Click the *Trim Lower* buttton. This will bring up a pop-up window to input the value that you entered as your lower trim point; click *Accept* if you are satisfied with the data received by the AIM.

The captured value will update to this value on the *Analog Input Trimming* screen.

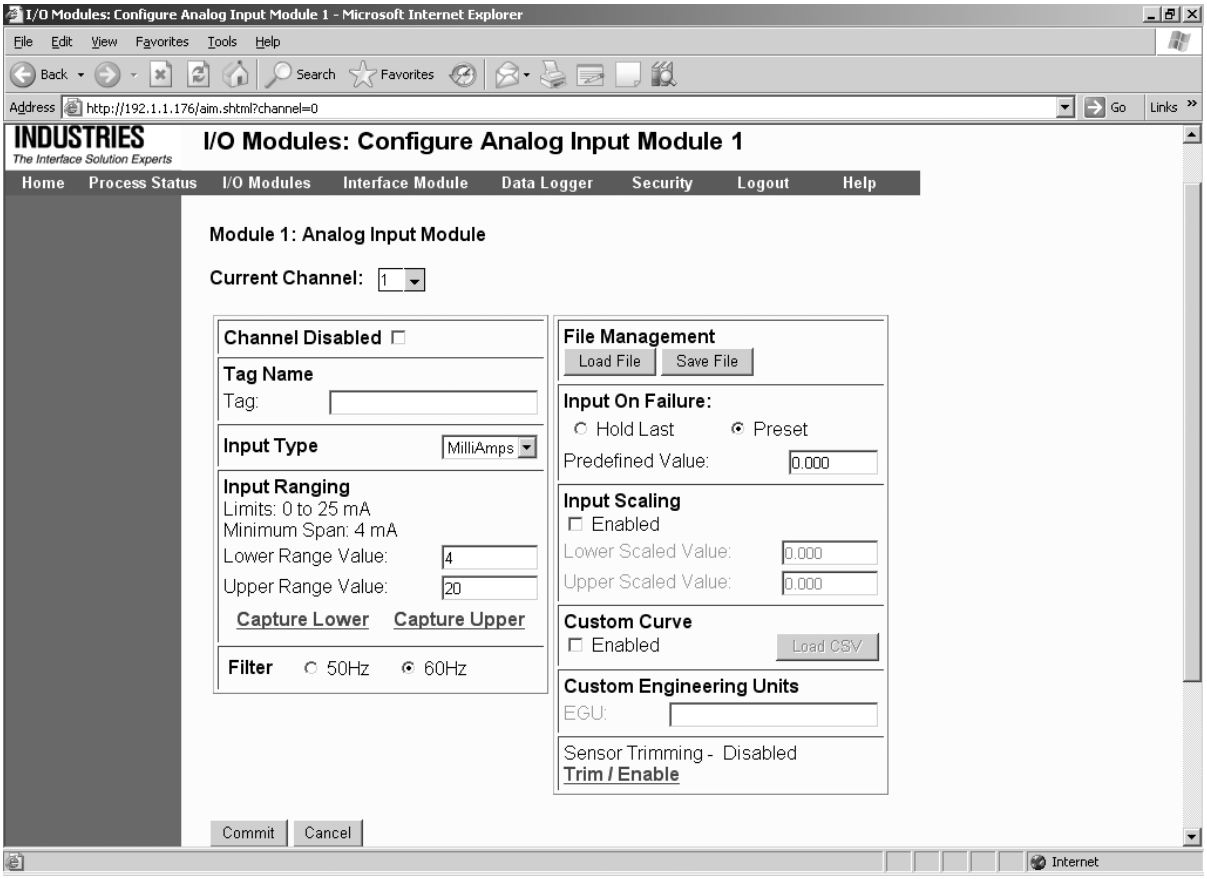
5. If performing 2 point trimming, repeat Steps 4 and 5 for the upper trim point.

6. Click *Submit* to save the trimming values and continue to the next channel.

Repeat these steps for each channel that requires trimming.

Commit/Cancel Buttons
Click *Commit* when you are finished selecting parameters to save the settings to memory. *Cancel* ends your configuration without saving changes.

Figure 11. *AIM Configuration Web Page*



Specifications

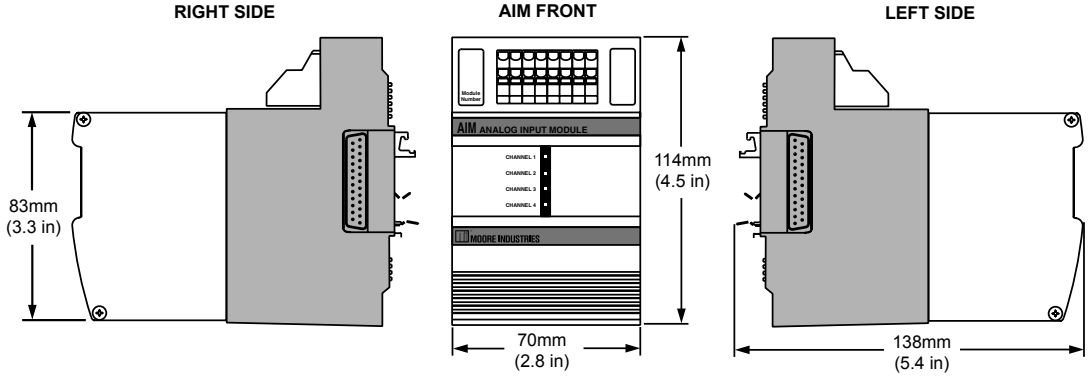
AIM Analog Input Module (4 Channels)

Up to Eight Per Interface Module

Performance	**Input Ranges:** Programmable for any range within: Current, 0-25mA (4mA minimum span) or Voltage, –10V to +10V (1V minimum span) **Accuracy:** ±0.01% of maximum span **Input Resolution:** 20-bit **Stability (% of max. span):** Current: 1-year, 0.047%; 3-year, 0.081%; 5-year, 0.11% Voltage: 1-year, 0.066%; 3-year, 0.11%; 5-year, 0.15% **Isolation:** 500Vrms, continuous, from channel to channel, from each channel to case, and from each channel to terminals of other attached NCS modules; will withstand 1000Vrms dielectric strength test for one minute, with no breakdown, from each channel to case, and from each channel to terminals of other attached NCS modules **Scan Time:** The time required for the Interface Module to access process variable and status data from all four channels of the AIM is 16ms **Response Time:** 60ms **Input Impedance:** Current, 20ohms; Voltage, 1Mohm **Maximum Input Overrange:** Current, ±100mA; Voltage, ±30V **Power Supply:** Power is supplied by the Interface Module, 4W maximum **Input Filter:** User-Programmable for 50Hz or 60Hz noise rejection **Linearization Capability:** Custom curve tables can be configured with up to 128 points using Internet Explorer web pages or PC-based software **Transmitter Excitation:** 21V/24mA excitation for powering a 2-wire transmitter **Diagnostic Information:** Refer to Appendix D, Table A-7
Status and Fault Indicators	One red/green LED per channel indicates proper channel operation (green) or that the channel is in a fault condition (red)
Ambient Conditions	**Operating Range:** –40°C to +85°C (–40°F to +185°F) **Storage Range:** –40°C to +85°C (–40°F to +185°F) **Ambient Temperature Effect:** 0.01% of maximum span/°C **Relative Humidity:** 0-95%, non-condensing **RFI/EMI Protection:** 20V/m @20-1000MHz, 1kHz AM when tested according to ENC61000-4-3-1996. **Common Mode Rejection:** 100dB@50/60Hz **Normal Mode Rejection:** Current, 60dB typical@10mA peak-to-peak; Voltage, 60dB typical@1V peak-to-peak, 50/60Hz
Weight	562 g (19.8 oz)

Specifications and information subject to change without notice.

Figure 12. *AIM Dimensions*



The AOM Analog Output Module

The Analog Output Module (AOM) accepts information from the NCS and outputs it as one of four independently configurable analog signals.

Installing the AOM

Installation consists of physically mounting the unit, completing the output connections, and grounding the unit.

Mounting
The AOM is designed to snap easily onto 32mm, G-type (EN50035) or 35mm Top Hat (EN50022) DIN-rails. Snap the AOM onto the DIN-rail to the right of the NCS unit, then slide it along the rail until the DB25 connectors on the side of the AOM connect completely with the unit to its left. See Figure 13 for illustration.

Recommended Ground Wiring Practices
Moore Industries recommends the following ground wiring practices:

- Any Moore Industries product in a metal case or housing should be grounded.
- The NCS individual module bases are mechanically grounded when installed onto the DIN-rail. Be sure the DIN-rail is connected to a system safety earth ground before making any other connections.
- All input signals to, and output signals from, Moore Industries' products should be wired using a shielded, twisted pair technique. Shields are to be connected to an earth or safety ground at the unit itself.
- The maximum length of unshielded input and output signal wiring should be 2 inches.

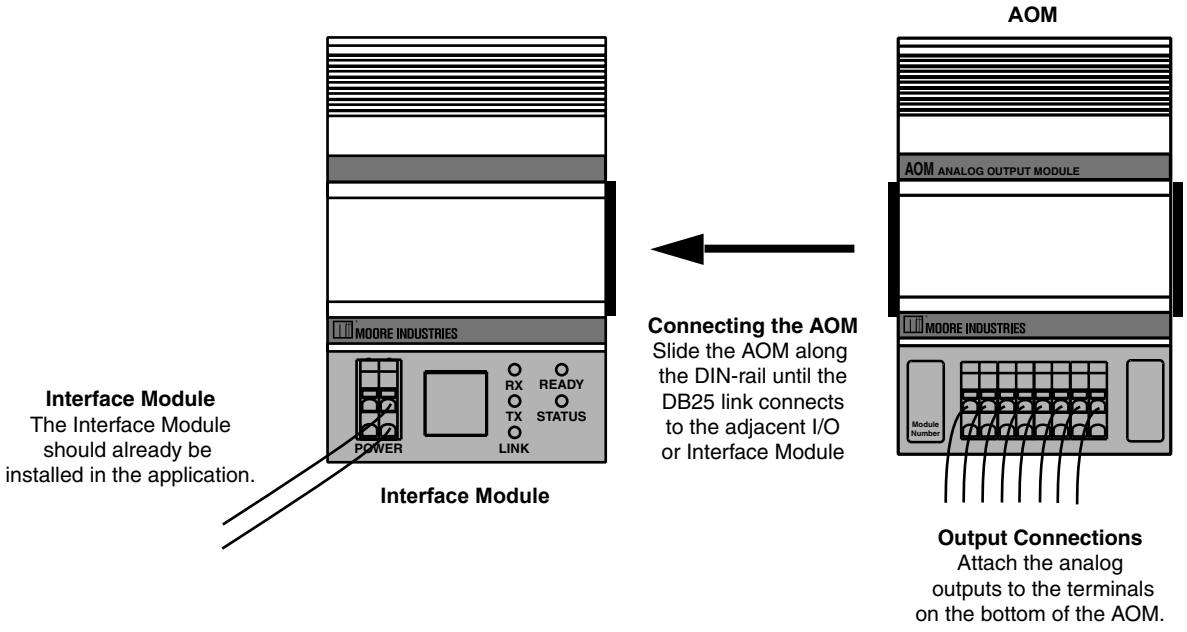
Input and Output Connections
After mounting, it is time to connect the analog outputs to the AOM. Since the AOM receives power from the connected Interface Module, only the analog outputs need to be connected. Figure 13 shows the connection diagrams for an AOM. The wire gauge requirement for NCS system modules is 12-28AWG.

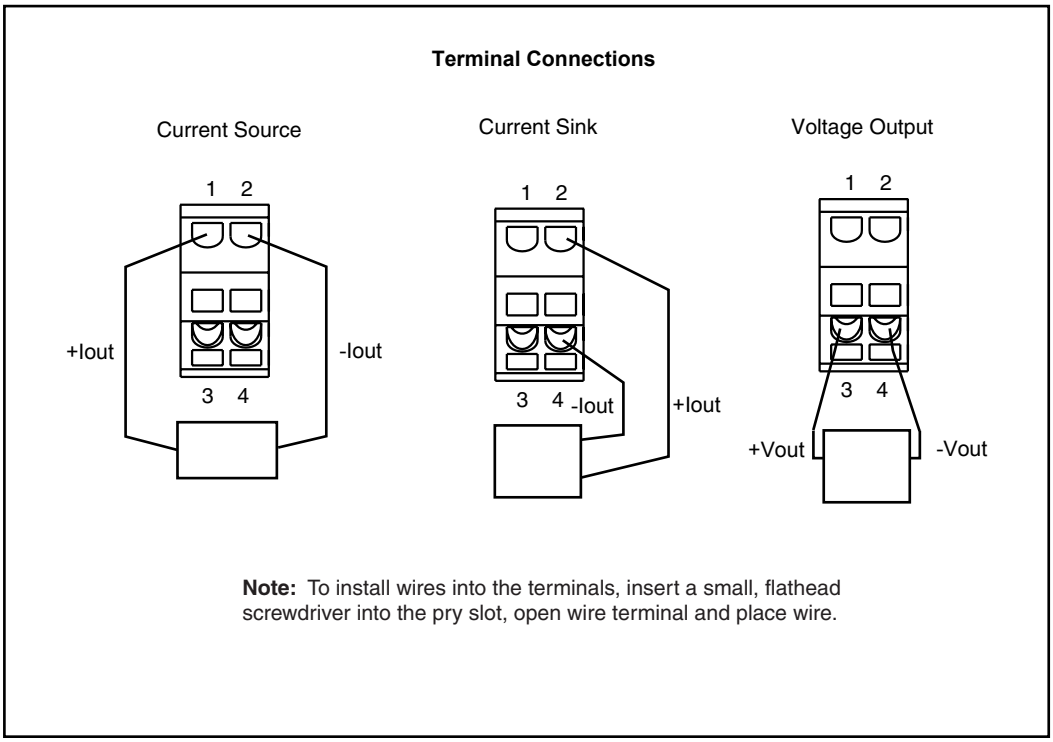
"Hot Swapable" I/O Modules
Should an Input/Output Module need to be replaced, simply program a new module, remove the old module from the mounting base and snap in the new one. For more specific instructions, see *Appendix F: Hot-Swapping a NET Concentrator Module*.

CE Conformity
Installation of any Moore Industries' product that carries the CE compliance marking (Commission Electro technique) must adhere to their respective installation guidelines in order to meet the requirements set forth in applicable EMC (Electromagnetic Compatibility) directive (EN61326). Consult the factory for additional information.

Figure 13. *AOM Connection Diagram*

Refer to Figure 25 for Terminal Designations





Note: To install wires into the terminals, insert a small, flathead screwdriver into the pry slot, open wire terminal and place wire.

Configuring the AOM

The AOM is configured using the web server contained within the Interface Module to which it is attached. To configure the AOM, you must first mount it to the Interface Module as described in *Installing the AOM*. To access real-time data using MODBUS commands instead of a web server, refer to *Appendix D: MODBUS/TCP Support.*

After mounting, bring up the NCS configuration software by following the instructions described in the *Connecting to the EIM Station* section of this manual.

Once you have accessed the NCS configuration software, click on *I/O Module*, then *Configure Analog Output Module.* This will display the screen shown in Figure 14. Configure the parameters listed on the screen, and when you are finished, press *Commit*.

Current Channel
The AOM comes standard with four channels, each independently configurable to handle current or voltage. Select the channel you wish to program.

Custom Tag
Assign tag names, or descriptors, to process variables. The *Process Status* page will display the data next to the respective process variable tag. These tags can also be read by the EIM OPC Server and can therefore be used to access process data in the EIM when configuring an OPC client.

Channel Disabled
Checking this box will cause the AOM and its associated Interface Module to ignore the selected channel, allowing you to use less than all four channels without receiving error messages.

Output Type
This programs the AOM to output either volt or mA. When an *Output Type* is selected, other parameters may become red, indicating that these parameters must be programmed.

Output Ranging
Allows you to input the upper and lower ranges that you want the AOM to output.

Output Damping
The Output Damping allows you to introduce a delay into the AOM's response to a change in input. The value of the output damping is the number of seconds that it will take for a display to make a 63% change in response to the change in input. A damping time of "0" will disable damping.

Output on Out-of-Range PV
These boxes allow you to enter the value that you want the AOM's output to default to when the monitored input goes out of range.

Loop Test
This function allows you test the other instruments on the loop by setting the AOM to output a specific value. After clicking *Loop Test*, use the arrows to select the desired value and press *Set Value* to begin.

File Management
If you will be using a common configuration within your NCS system, you can create a configuration and save it to a file so that you can load it into your next channel or module. Refer to *Appendix G: File Management* for details.

Output on Failure
This section tells the AOM what to do when the monitored input fails entirely. It will either maintain the last value (*Hold Last*), or jump to a predefined value that you input (*Preset Predefined Value*).

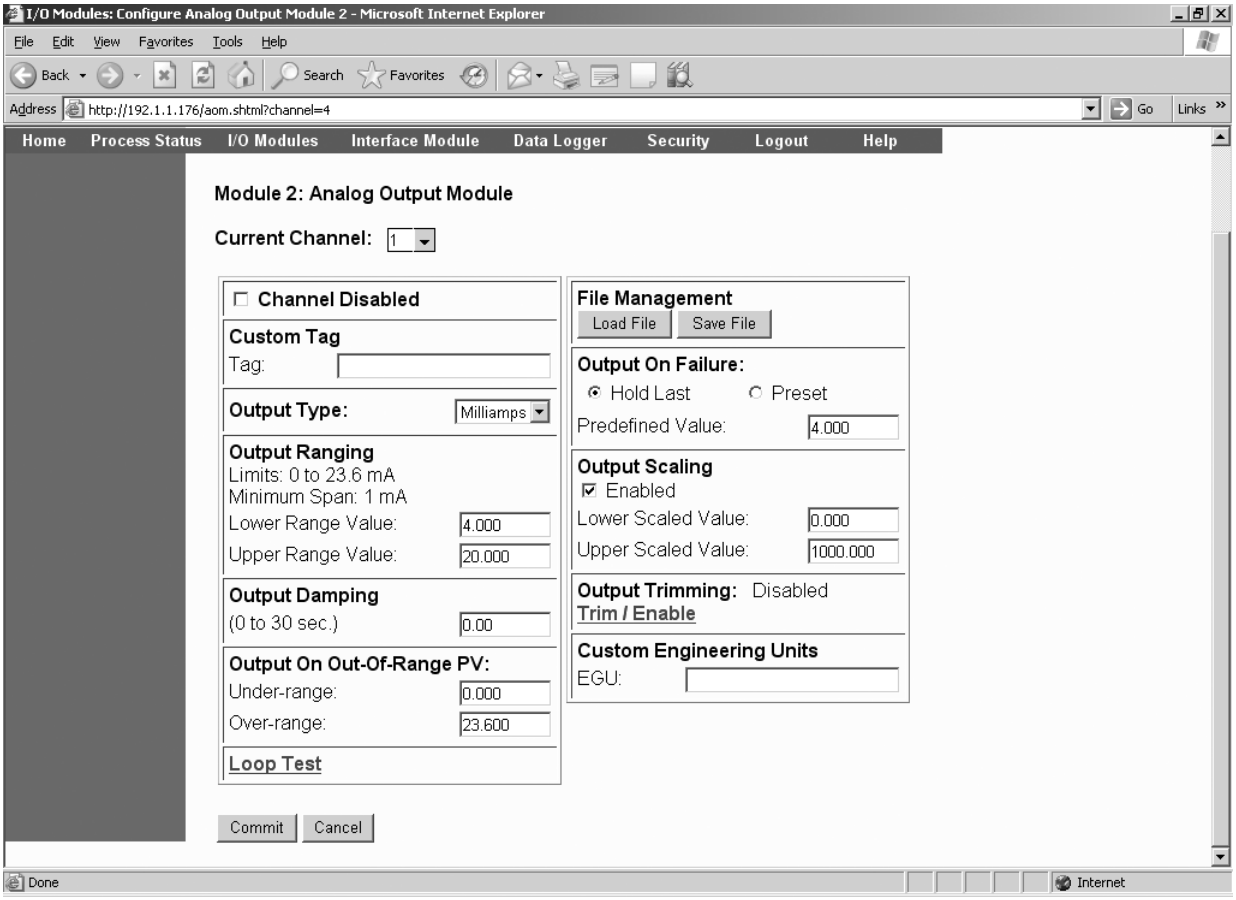
Output Scaling
Output Scaling allows you to access the analog output process variable in a number range more meaningful to you than the actual mA or Volts output. For example, if the actual output range is 4-20mA, set the scaled range to 0-100; you now write 0 to the process variable to get 4mA out and 100 to get 20mA out.

Output Trimming
The AOM can be trimmed with two data points within the selected zero and span output range. This allows a complete range to be output, while placing an emphasis on a specific segment of the range most critical to the process.

Custom Engineering Units
The I/O configuration web pages allow you to customize the process variable engineering units (EGU). The data can then be viewed on the *Process Status* page with the correct units.

Commit/Cancel Buttons
Click *Commit* when you are finished selecting parameters to save the settings to memory. *Cancel* ends your configuration without saving changes.

Figure 14. *AOM Configuration Web Page*



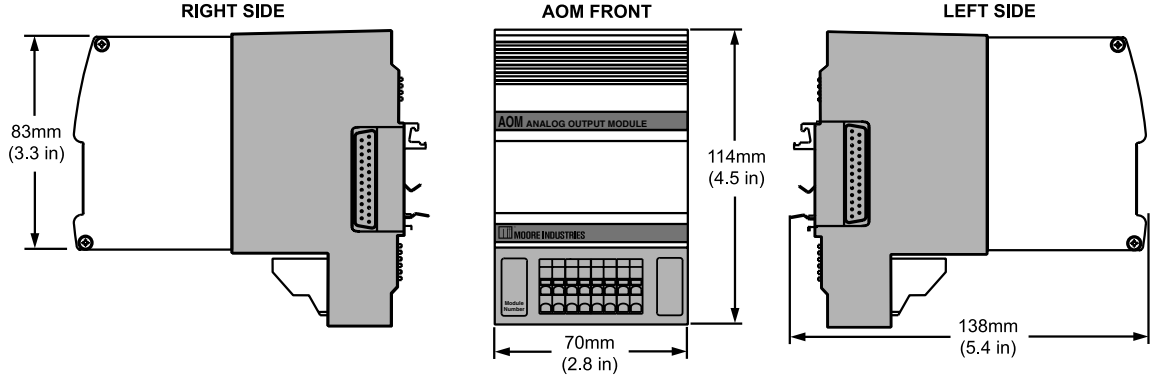
Specifications

AOM Analog Output Module (4 Channels)
Up to Eight per Interface Module

Performance	**Output Ranges:** Programmable for any range within: Current (sink or source), 0-20mA or Voltage, 0-10V **Accuracy:** ±0.015% of maximum span **Output Resolution:** 18-bit **Stability (% of max. span):** Current: 1-year, 0.012%; 3-year, 0.020%; 5-year, 0.026% Voltage: 1-year, 0.066%; 3-year, 0.11%; 5-year, 0.15% **Isolation:** 500Vrms, continuous, from channel to channel, from each channel to case, and from each channel to terminals of other attached NCS modules; will withstand 1000Vrms dielectric strength test for one minute, with no breakdown, from each channel to case, and from each channel to terminals of other attached NCS modules **Scan Time:** The time required for the Interface Module to access process variable and status data from all four channels of the AOM is 16ms **Response Time:** 50ms to 90% of final value on a step input
Performance (continued)	**Output Damping:** Increases response time by adjusting filter time constant from 0-30 seconds **Ripple:** Current, 10mV peak-to-peak measured across a 250ohm load resistor; Voltage, 50mV peak-to-peak maximum **Load Capability:** Current, 0-1000ohms (source), 42V maximum (sink) 1500ohms; Voltage, 0-5mA (2000 ohms minimum load) **Output Limiting:** Current output is guaranteed up to 21.6mA (or 10% of full scale above the programmed full value) and limits at 23.6mA; Voltage output accuracy is guaranteed up to 10.5V (or 5% of full scale above the programmed full value) and limits at 11.0V **Load Effect (current outputs):** 0.01% of span from 0 to maximum load resistance on current output **Output Failure Mode:** Outputs are programmable to either
Performance (continued)	hold last value or go to a pre-defined value on error upon lost communication with the Interface Module or upon receiving invalid primary variable data **Power Supply:** Power is supplied by the Interface Module, 4W maximum **Diagnostic Information:** Refer to Appendix D, Table A-8
Status and Fault Indicators	One red/green LED per channel indicates proper channel operation (green) or that the channel is in a fault condition (red)
Ambient Conditions	**Operating Range:** –40°C to +85°C (–40°F to +185°F) **Storage Range:** –40°C to +85°C (–40°F to +185°F) **Ambient Temperature Effect:** 0.01% of maximum span/°C **Relative Humidity:** 0-95%, non-condensing **RFI/EMI Protection:** 20V/m@20-1000MHz, 1kHz AM when tested according to ENC61000-4-3-1996
Weight	765 g (27 oz)

Specifications and information subject to change without notice.

Figure 15. *AOM Dimensions*



The CPM NET Concentrator System Power Module

An Interface Module can only power two I/O modules; the CPM provides additional power, allowing up to eight I/O modules of any type to be attached to one Interface Module.

An EIM can support a maximum of sixteen modules, in which case two CPM modules would be required for power. This forms a fully populated system.

Note:

*The EIM Interface Module provides power for up to two I/O Modules. If more than two I/O Modules will be connected to the Interface Module, a CPM Concentrator Power Module is required. It works in conjunction with the EIM to power stations of up to eight I/O Modules. However, the CPM will only power units that are mounted to **its** left (from the user's front-view perspective, this would be the right side of the CPM).*

Installing the CPM

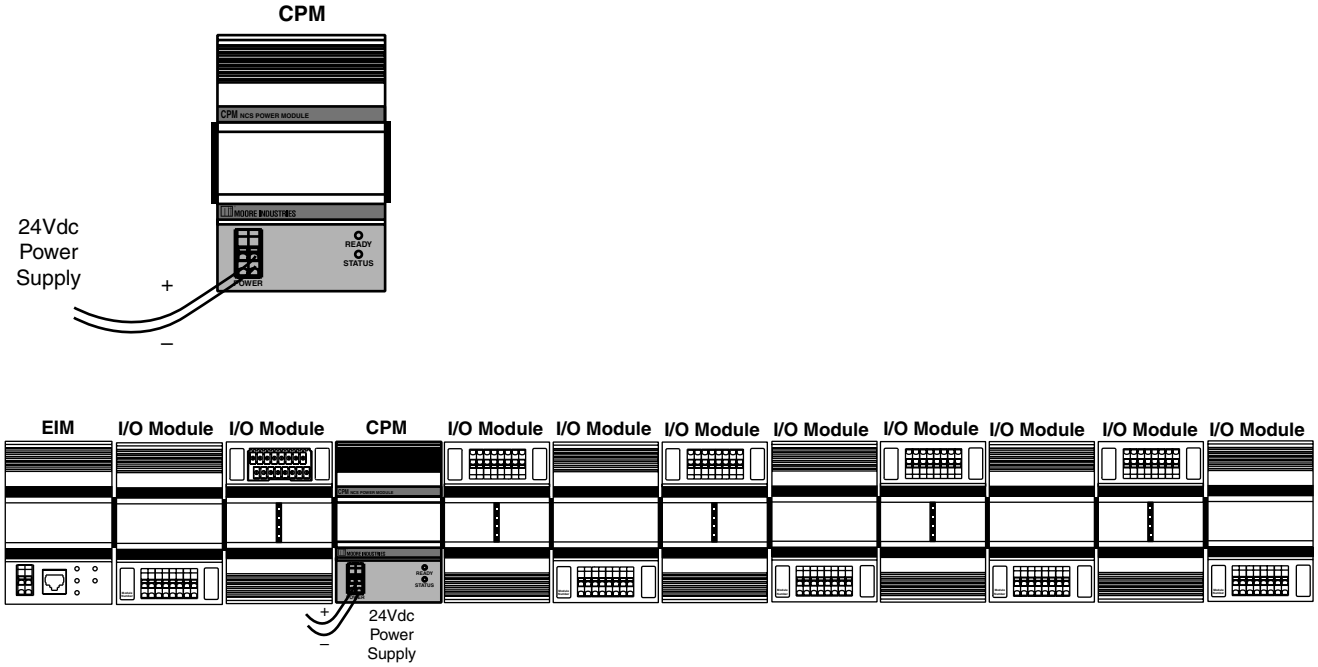
Installation consists of physically mounting the unit, making the power connections, and grounding the unit.

Mounting

The CPM is designed to snap easily onto 32mm, G-type (EN50035) or 35mm Top Hat (EN50022) DIN-rails. Snap the CPM onto the DIN-rail to the right of any module within the NCS station, then slide it along the rail until the DB25 connectors on the side of the CPM connect completely with the unit to its left. The CPM can be installed at any position within a NET Concentrator System.

Figure 16. *CPM Connection Diagram*

Refer to Figure 25 for Terminal Designations



Specifications

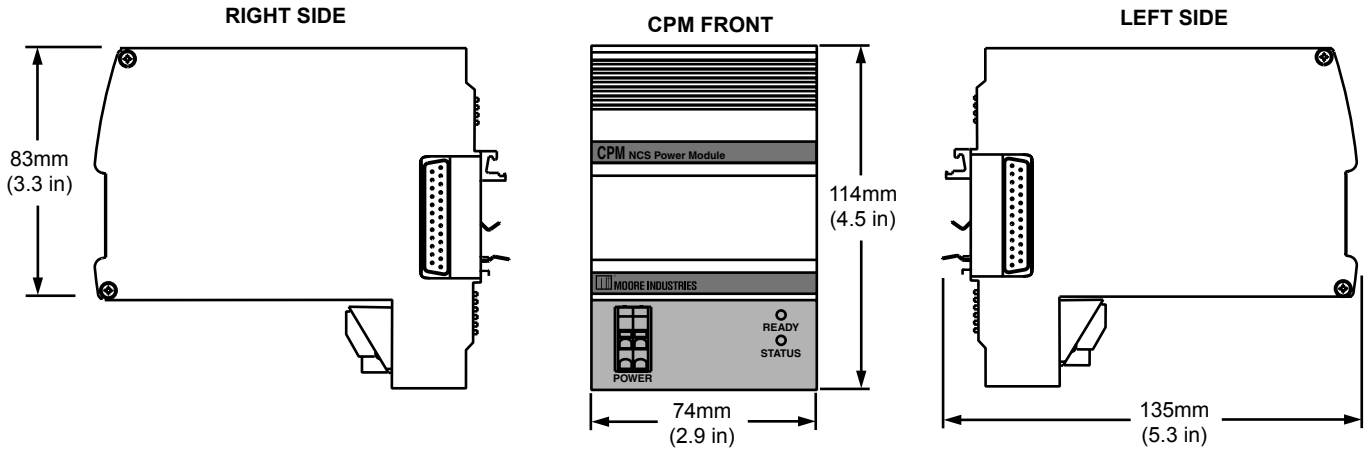
CPM Power Supply Module

One Required Per NET Concentrator System Station if There Are More Than Two Input/Output Modules

Performance	**Inputs (Power):** 20-30Vdc **Output (Power):** Provides power to up to eight NCS I/O modules **Isolation:** 500 Vrms, continuous, and will withstand 1000Vrms dielectric strength test for 1 minute with no breakdown, between power input, each Modbus port, case and terminals of other attached NCS modules **Startup Time:** 10ms **Power Consumption:** 40W maximum	**Status and Fault Indicators**	**Power LED:** A green LED turns on to indicate that power is being supplied to the power terminals. **Status LED:** A green LED turns on to indicate that power is available at the CPM module's output	**Ambient Conditions (continued)**	**Relative Humidity:** 0-95%, non-condensing **RFI/EMI Protection:** 20V/m@20-1000MHz, 1kHz AM when tested according to ENC61000-4-3-1996
		Ambient Conditions	**Operating Range:** –40°C to +85°C (–40°F to +185°F) **Storage Range:** –40°C to +85°C (–40°F to +185°F)	**Weight**	585 g (20.7 oz)

Specifications and information subject to change without notice.

Figure 17. *CPM Dimensions*



Recommended Ground Wiring Practices
Moore Industries recommends the following ground wiring practices:

- Any Moore Industries product in a metal case or housing should be grounded.
- The NCS individual module bases are mechanically grounded when installed onto the DIN-rail. Be sure the DIN-rail is connected to a system safety earth ground before making any other connections.
- The maximum length of unshielded input and output signal wiring should be 2 inches.

Power Connections
After mounting, it is time to power the CPM. Attach 20-30Vdc power as shown in Figure 16. The wire gauge requirement for NCS system modules is 12-28AWG.

Power Sourcing Parameters for General Locations, Intrinsically Safe, and Non-Incendive/Type N applications
In accordance with IEC 1010.1 Annex H (all models), the input terminals must be connected to and/or supplied from a certified energy limiting Class 2 or a Separate Extra Low Voltage (S.E.L.V.) power supply separated from all mains by double/reinforced insulation.

CE Conformity
Installation of any Moore Industries' product that carries the CE compliance marking (Commission Electro technique) must adhere to their respective installation guidelines in order to meet the requirements set forth in applicable EMC (Electromagnetic Compatibility) directive (EN61326). Consult the factory for additional information.

The DIM Discrete Input Module

The Discrete Input Module (DIM) of the NCS family isolates and conditions up to eight discrete signals, and relays input information to the Interface Module. The DIM is available for three different discrete input channel types: contact closure, high range voltage, or low range voltage. See the NCS Data Sheet for more information on module types and options.

Installing the DIM

Installation consists of physically mounting the unit, completing the input connections, and grounding the unit.

Mounting
The DIM is designed to snap easily onto 32mm, G-type (EN50035) or 35mm Top Hat (EN50022) DIN-rails. Snap the DIM onto the DIN-rail to the right of the NCS unit, then slide it along the rail until the DB25 connectors on the side of the DIM connect completely with the unit to its left. See Figure 18 for illustration.

Recommended Ground Wiring Practices
Moore Industries recommends the following ground wiring practices:

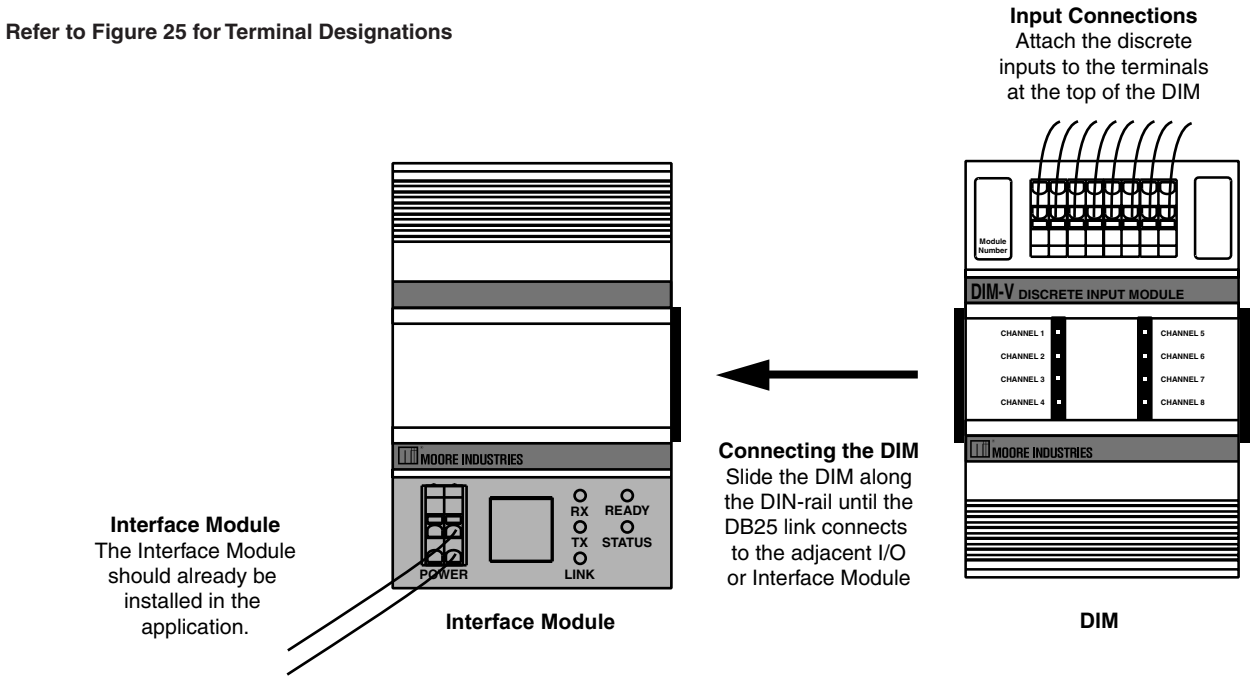
- Any Moore Industries product in a metal case or housing should be grounded.
- The NCS individual module bases are mechanically grounded when installed onto the DIN-rail. Be sure the DIN-rail is connected to a system safety earth ground before making any other connections.
- All input signals to, and output signals from, Moore Industries' products should be wired using a shielded, twisted pair technique. Shields are to be connected to an earth or safety ground near the unit itself.
- The maximum length of unshielded input and output signal wiring should be 2 inches.

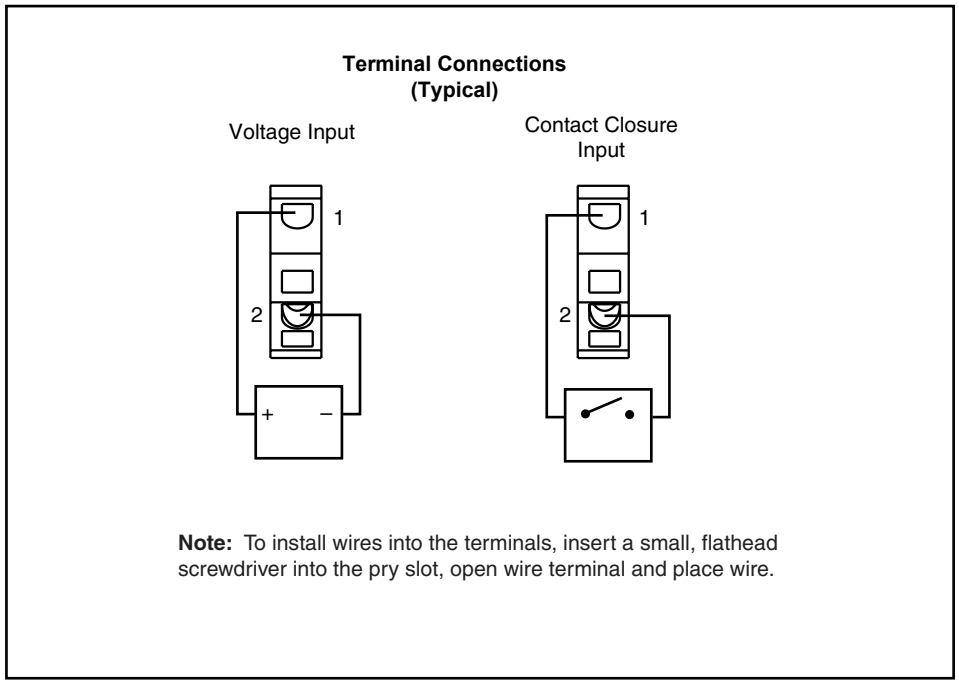
Input Connections
After mounting, it is time to connect the discrete inputs to the DIM. Since the DIM receives power from the connected Interface Module, only the discrete inputs need to be connected. Figure 18 shows the connection diagrams for the DIM. The wire gauge requirement for NCS system modules is 12-28AWG.

"Hot Swapable" I/O Modules
Should an Input/Output Module need to be replaced, simply program a new module, remove the old module from the mounting base and snap in the new one. For more specific instructions, see *Appendix F: Hot-Swapping a NET Concentrator Module*.

CE Conformity
Installation of any Moore Industries' product that carries the CE compliance marking (Commission Electro technique) must adhere to their respective installation guidelines in order to meet the requirements set forth in applicable EMC (Electromagnetic Compatibility) directive (EN61326). Consult the factory for additional information.

Figure 18. *DIM Connection Diagram*





Note: To install wires into the terminals, insert a small, flathead screwdriver into the pry slot, open wire terminal and place wire.

Configuring the DIM

The DIM is configured using the web server contained within the Interface Module it is attached to. To configure the DIM, you must first mount it to the Interface Module as described in *Installing the DIM*. To access real-time data using modbus commands instead of the web server, see *Appendix D: MODBUS/TCP Support.*

After mounting, bring up the NCS configuration software by following the instructions described in the *Connecting to the EIM Station* section of this manual.

Once you have accessed the NCS configuration software, click on *I/O Module*, then *Configure Discrete Input Module.* This will display the screen shown in Figure 19.

Configure the parameters listed on the screen, and when you are finished, press *Commit*.

Contact Debounce (Contact Closure DIM units only)
When some contacts open or close, there can be a short period of oscillation resulting from the mechanical contacts. The *Contact Debounce* setting causes the NCS to ignore false signals caused by these oscillations. This setting is only available with contact closure DIM modules.

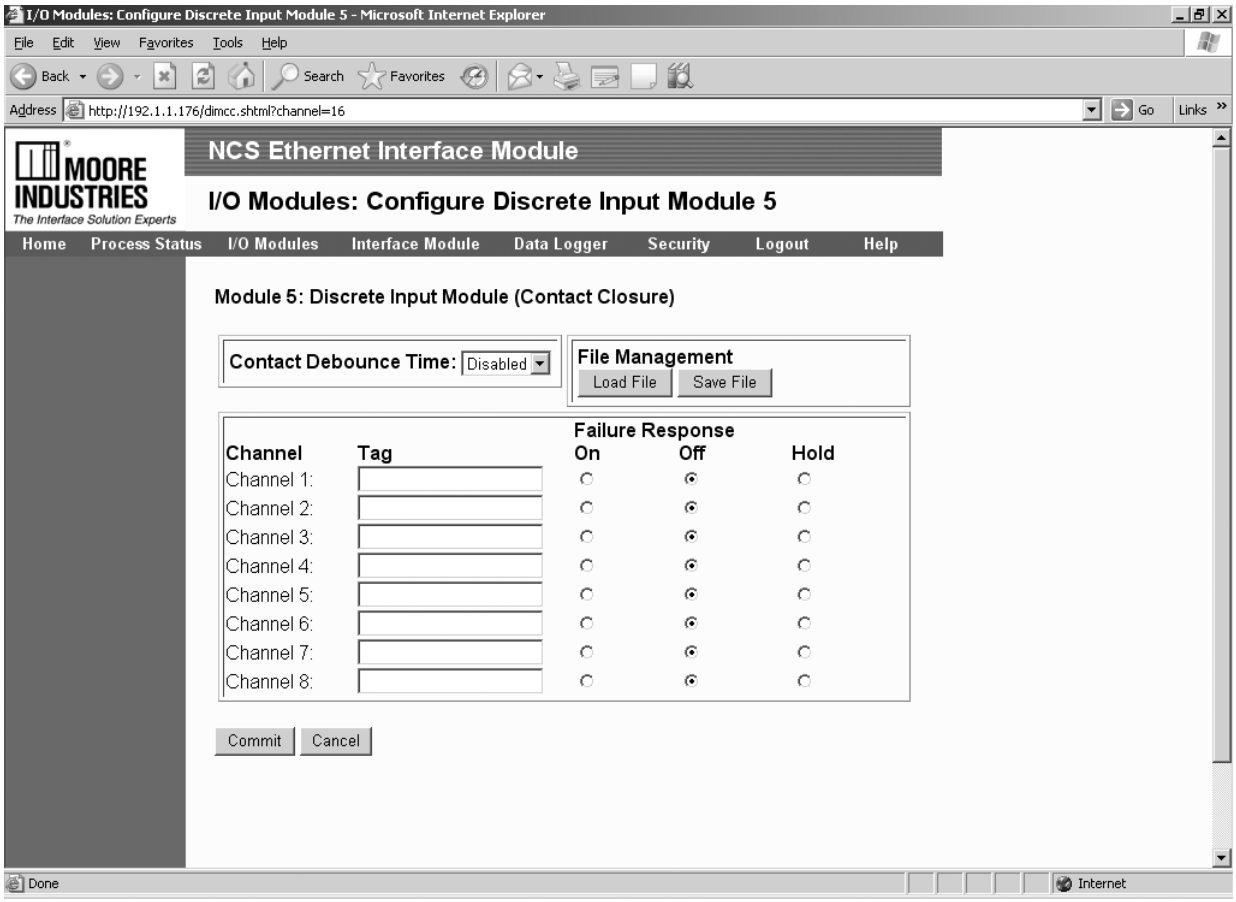
File Management
If you will be using a common configuration within your NCS system, you can create a configuration and save it to a file so that you can load it into your next channel or module. Refer to *Appendix G: File Management* for details.

Tag
Assign a tag name, or descriptor, to process variables for each channel. The *Process Status* page will display the data next to the respective process variable tag. These tags can also be read by the EIM OPC Server and can therefore be used to access process data in the EIM when configuring an OPC client.

Failure Response
This section tells the ROM what to do if communication with the Interface Module fails. It will either maintain the last value (*Hold*), or turn the relay to a predetermined energized or de-energized state (*On/Off*).

Commit/Cancel Buttons
Click *Commit* when you are finished selecting parameters to save the settings to memory. *Cancel* ends your configuration without saving changes.

Figure 19. *DIM Configuration Web Page*



Specifications

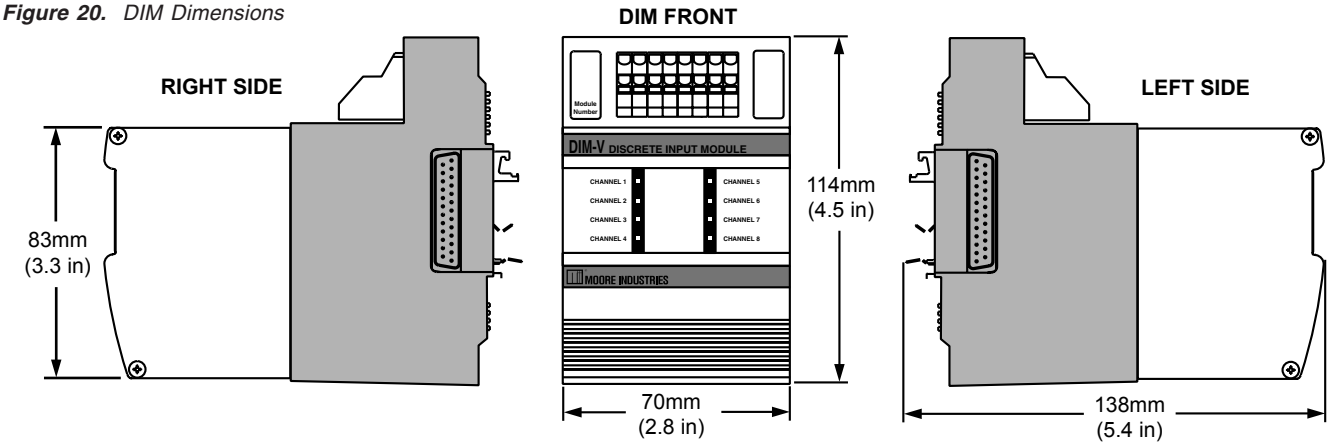
DIM Discrete Contact Closure Input Module (8 Channels)
Up to Eight Per Interface Module

Performance	**Input Ratings:** 24V/3.7mA, internally powered **Input Logic Threshold:** 8V low-going; 16V high-going **Input Logic:** Closed contact input yields logic 1 **Isolation:** 500Vrms, continuous, from channel to channel, from each channel to case, and from each channel to terminals of other attached NCS modules; will withstand 1000Vrms dielectric strength test for one minute, with no breakdown, from each channel to case,	**Performance (continued)**	and from each channel to terminals of other attached NCS modules **Scan Time:** 16ms **Response Time:** <12ms with contact debounce disabled **Power Supply:** Power is supplied by the Interface Module, 3W maximum **Diagnostic Information:** Refer to Appendix D, Table A-9	**Ambient Conditions**	**Operating Range:** –40°C to +85°C (–40°F to +185°F) **Storage Range:** –40°C to +85°C (–40°F to +185°F) **Relative Humidity:** 0-95%, non-condensing **RFI/EMI Protection:** 20V/m @20-1000MHz, 1kHz AM when tested according to IEC1000-4-3-1995
		LED Indicators	One red/green LED per channel indicates input state, with red indicating open contact input	**Weight**	493 g (17.4 oz)

DIM Discrete Voltage Input Module (8 Channels)
Up to Eight Per Interface Module

Performance	**Input Ratings:** Low Range, 30Vac/Vdc; High Range: 120/240Vac/Vdc **Input Logic Threshold:** Low Range: <9Vac or DC guaranteed low, >15Vac or DC guaranteed high; High Range: <55Vac or dc guaranteed low, >90Vac or dc guaranteed high **Input Logic:** Input above threshold yields logic 1; Input below threshold yields logic 0 **Input Impedance:** Each input draws <4mA when on **Isolation:** 500Vrms, continuous, from channel to channel, from each channel to case, and from each channel to terminals of other	**Performance (continued)**	attached NCS modules; will withstand 1000Vrms dielectric strength test for one minute, with no breakdown, from each channel to case, and from each channel to terminals of other attached NCS modules **Scan Time:** 16ms **Response Time:** <30ms **Maximum Input Overrange:** Up to 260Vac/Vdc **Power Supply:** Power is supplied by the Interface Module, 1W maximum **Diagnostic Information:** Refer to Appendix D, Table A-9	**LED Indicators**	One red/green LED per channel indicates input state, with red indicating input below threshold
				Ambient Conditions	**Operating Range:** –40°C to +85°C (–40°F to +185°F) **Storage Range:** –40°C to +85°C (–40°F to +185°F) **Relative Humidity:** 0-95%, non-condensing **RFI/EMI Protection:** 20V/m @20-1000MHz, 1kHz AM when tested according to IEC1000-4-3-1995
				Weight	536 g (18.8 oz)

Figure 20. *DIM Dimensions*



The ROM Relay Output Module

The Relay Output Module (ROM) accepts information from the NCS and outputs it to either four or eight independently configurable relay signals.

Installing the ROM

Installation consists of physically mounting the unit, completing the output connections, and grounding the unit.

Mounting

The ROM is designed to snap easily onto 32mm, G-type (EN50035) or 35mm Top Hat (EN50022) DIN-rails. Snap the ROM onto the DIN-rail to the right of the NCS unit, then slide it along the rail until the DB25 connectors on the side of the ROM connect completely with the unit to its left. See Figure 21 for illustration.

Recommended Ground Wiring Practices

Moore Industries recommends the following ground wiring practices:

- Any Moore Industries product in a metal case or housing should be grounded.
- The NCS individual module bases are mechanically grounded when installed onto the DIN-rail. Be sure the DIN-rail is connected to a system safety earth ground before making any other connections.
- All input signals to, and output signals from, Moore Industries' products should be wired using a shielded, twisted pair technique. Shields are to be connected to an earth or safety ground near the unit itself.
- The maximum length of unshielded input and output signal wiring should be 2 inches.

Input Connections

After mounting, it is time to connect the relay outputs to the ROM. Since the ROM receives power from the connected Interface Module, only the relay outputs need to be connected. Figure 21 shows the connection diagrams for a ROM. The wire gauge requirement for NCS system modules is 12-28AWG.

"Hot Swapable" I/O Modules

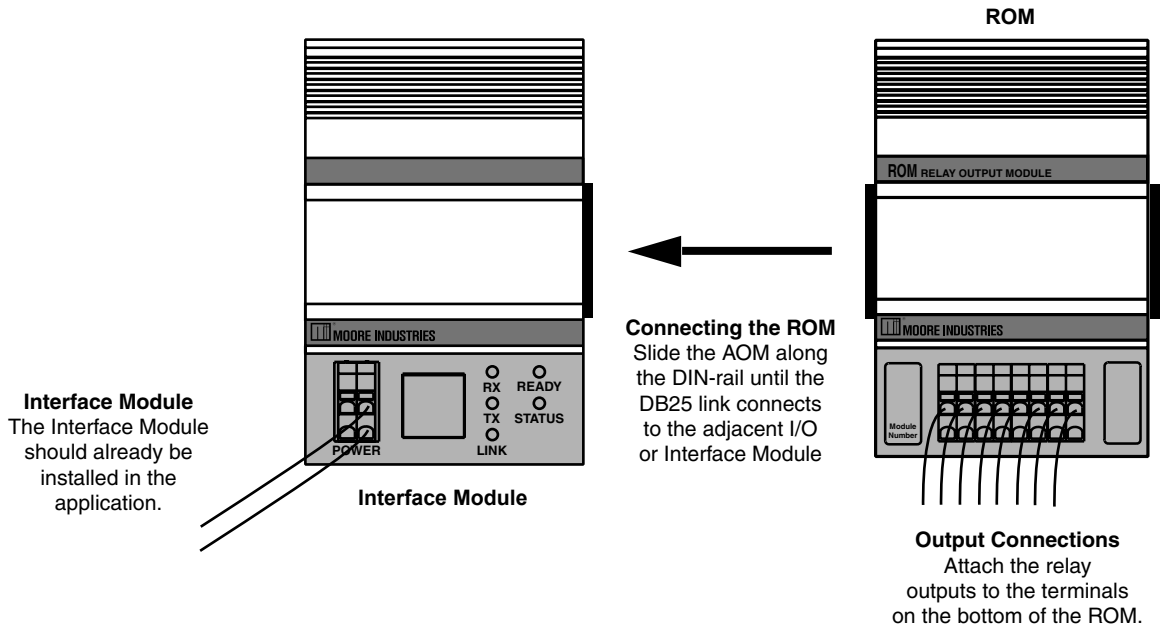
Should an Input/Output Module need to be replaced, simply program a new module, remove the old module from the mounting base and snap in the new one. For more specific instructions, see *Appendix F: Hot-Swapping a NET Concentrator Module*.

CE Conformity

Installation of any Moore Industries' product that carries the CE compliance marking (Commission Electro technique) must adhere to their respective installation guidelines in order to meet the requirements set forth in applicable EMC (Electromagnetic Compatibility) directive (EN61326). Consult the factory for additional information.

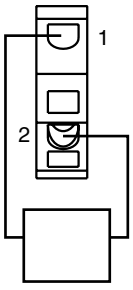
Figure 21. *ROM Connection Diagram*

Refer to Figure 25 for Terminal Designations



Terminal Connections

Relay Output



Note: To install wires into the terminals, insert a small, flathead screwdriver into the pry slot, open wire terminal and place wire.

Configuring the ROM

The ROM is configured using the web server contained within the Interface Module it is attached to. To configure the ROM, you must first mount it to the Interface Module as described in *Installing the ROM*. To access real-time data using Modbus commands instead of a web server, see *Appendix D: MODBUS/TCP Support.*

After mounting, bring up the NCS configuration software by following the instructions described in the *Connecting to the EIM Station* section of this manual.

Once you have accessed the NCS configuration software, click on *I/O Module*, then *Configure Relay Output Module.* This will display the screen shown in Figure 22.

Configure the parameters listed on the screen, and when you are finished, press *Commit*.

When energized, LEDs are:
Allows you to input the color (red or green) of the LED when the relay is energized.

File Management
If you will be using a common configuration within your NCS system, you can create a configuration and save it to a file so that you can load it into your next channel or module. Refer to *Appendix G: File Management* for details.

Tag
Assign a tag name, or descriptor, to process variables for each channel. The *Process Status* page will display the data next to the respective process variable tag. These tags can also be read by the EIM OPC Server and can therefore be used to access process data in the EIM when configuring an OPC client.

Relay on Powerup
Checking a box configures the corresponding relay to be on (energized) upon power up for each channel for which you have checked the box.

Failure Response
This section tells the ROM what to do if communication with the Interface Module fails. It will either maintain the last value (*Hold*), or turn the relay to a predetermined energized or de-energized state (*On/Off*).

Output Test
This function allows you to change the state of each relay. After clicking *Output Test*, use the check boxes to select the desired relays and press *Update Output*. A checked box energizes the corresponding relay.

Commit/Cancel Buttons
Click *Commit* when you are finished selecting parameters to save the settings to memory. *Cancel* ends your configuration without saving changes.

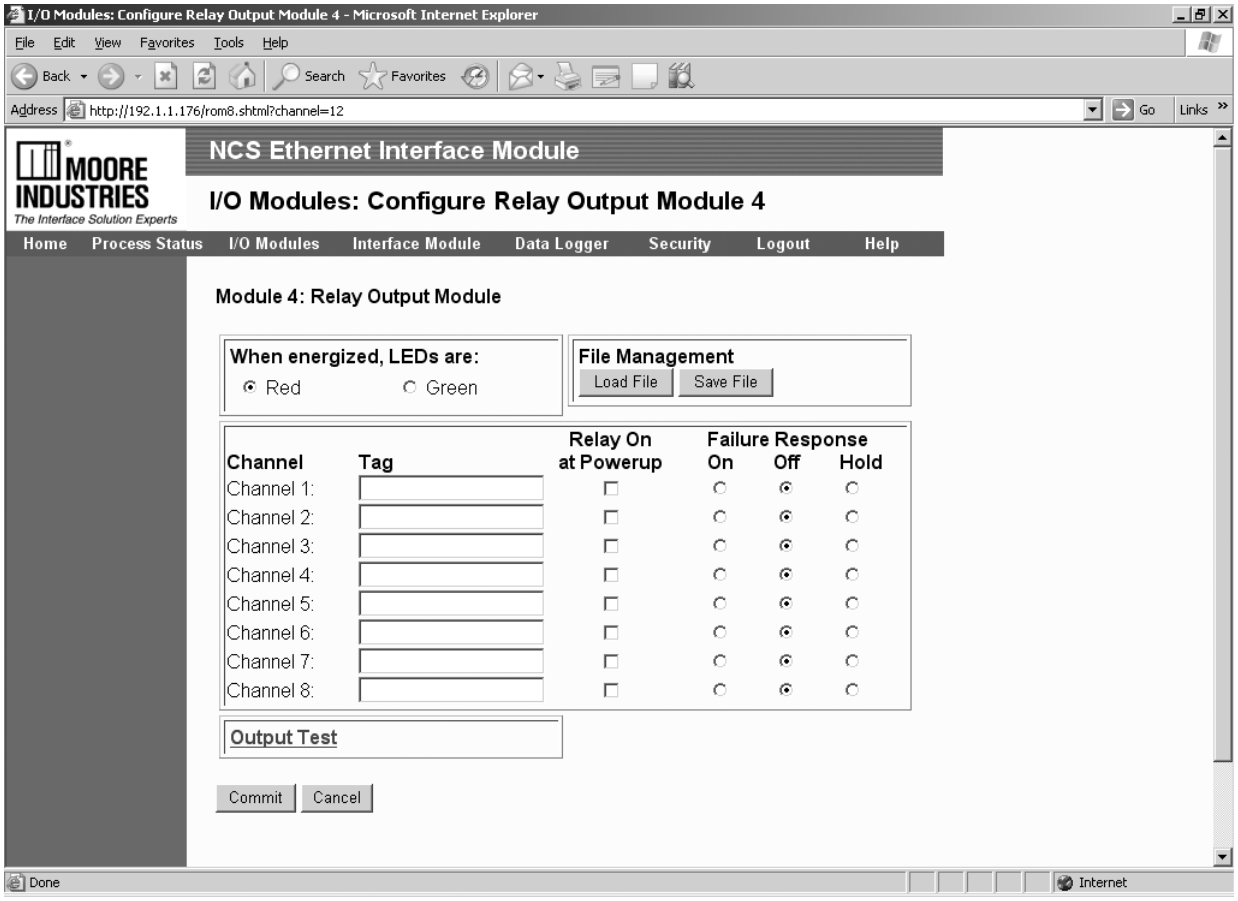
Setting Relay Jumpers

ROM relay jumpers are user-configurable and used to set the individual relays as normally open or normally closed.

To access the jumpers, disengage the plastic shroud from the ROM unit. Refer to Figure A-5 in the *Hot-Swapping a NET Concentrator® Module* section of this manual for instruction regarding removal. Next, remove both side panels by removing the four screws on each panel. Once the side panels are removed, gently apply pressure to the edges of the PC boards exposed in order to slide out the board assembly. Follow front panel LED orientation for the relays requiring configuration (from a front-view, jumpers for relays 1-4 would be accessed from the left side of the unit; relays 5-8 would be accessed from the right side).

The ROM is comprised of two boards of four relays each. These boards face each other in opposite orientation. To correctly set the jumpers, ensure that you are referencing each board as shown in Figure 24.

Figure 22. *ROM Configuration Web Page*



Specifications

ROM Relay Output Module
Up to Eight Per Interface Module

Performance

Mechanical Output Ratings: SPST relay, 1 form A or B, rated 2A@250Vac, 50/60Hz or 2A@30Vdc, non-inductive
Output Logic: Logic 1 yields energized relay
Output Failure Mode: Outputs are programmable to either hold last value, or go energized or de-energized upon lost communication with the Interface Module
Scan Time: 16ms
Isolation: 500Vrms, continuous, from channel to channel, from each channel to case, and from each channel to terminals of other attached NCS modules; will withstand 1000Vrms dielectric strength test for one minute, with no breakdown, from each channel to case, and from each channel to terminals of other attached NCS modules
Response Time: <10ms
Power Supply: Power is supplied by the Interface Module, 3W maximum
Diagnostic Information: Refer to Appendix D, Table A-9

Performance (continued)

LED Indicators

One red/green LED per channel indicates relay state and can be programmed for desired sense

Ambient Conditions

Operating Range: –40°C to +85°C (–40°F to +185°F)
Storage Range: –40°C to +85°C (–40°F to +185°F)
Relative Humidity: 0-95%, non-condensing
RFI/EMI Protection: 20V/m @20-1000MHz, 1kHz AM when tested according to IEC1000-4-3-1995

Weight

493 g (17.4 oz)

Figure 23. *ROM Dimensions*

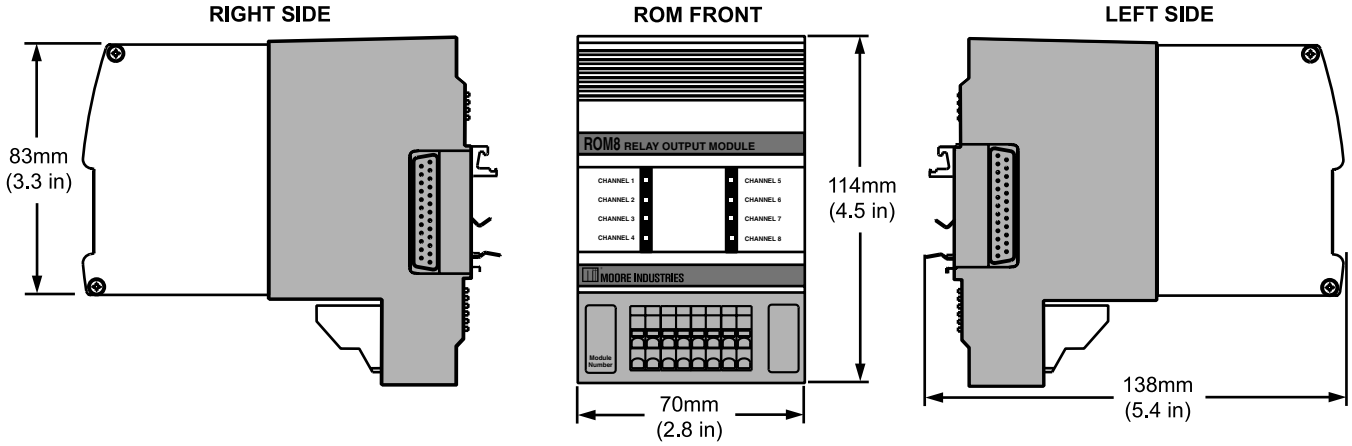
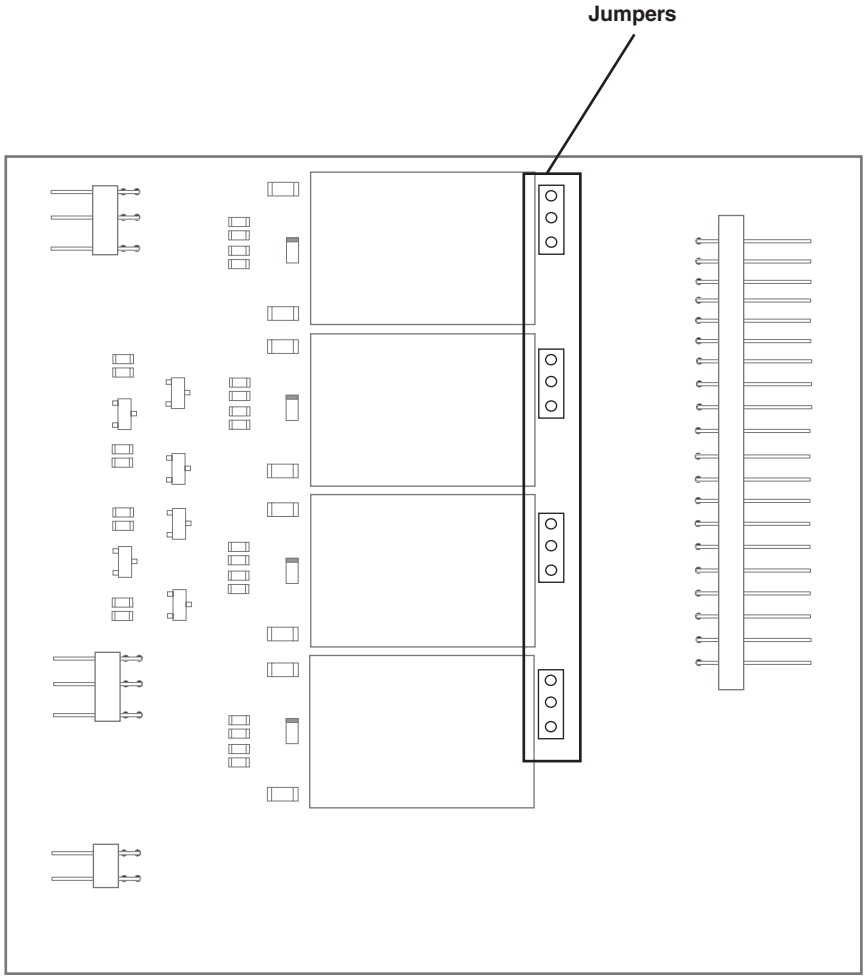


Figure 24. *ROM Relay Jumper Position*

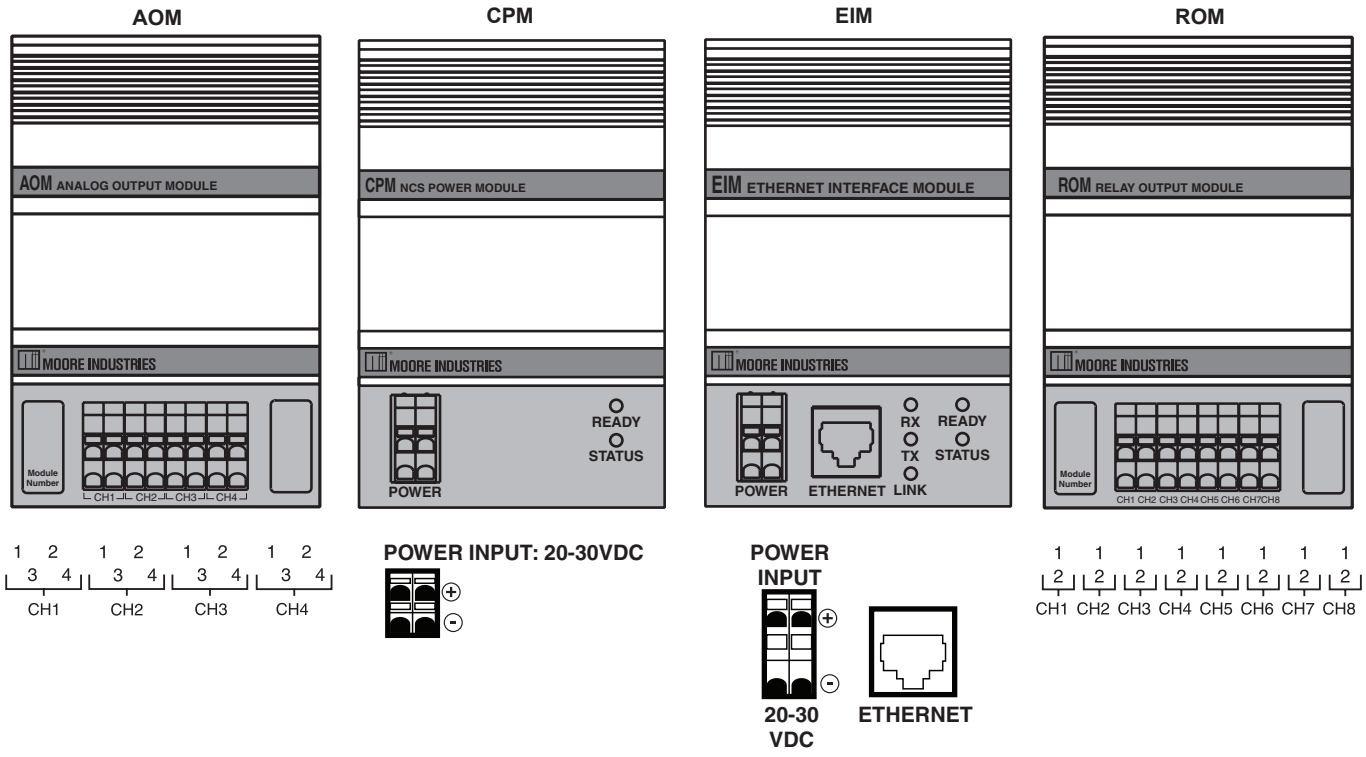


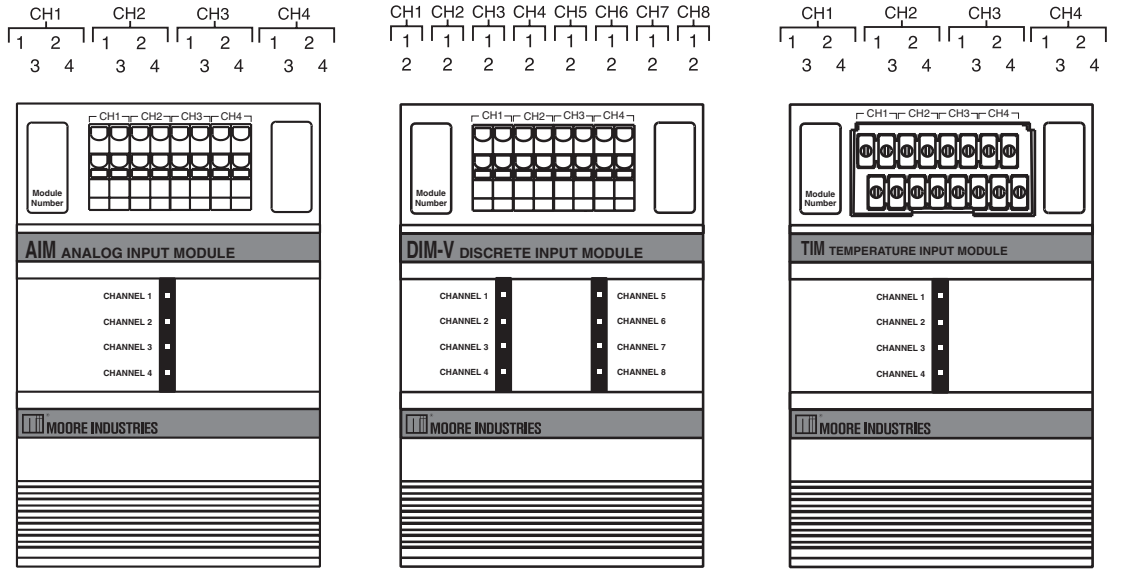
Jumper Position

Normally Closed

Normally Open

Figure 25. *Terminal Designations of EIM and I/O Modules*





Appendix A: Configuring the Data Logger

The data logger records process variable data at a selected interval from specified I/O channels. From the data logger menu item you can access web pages where you can configure the data logger, view status or data logger files.

NCS stations using EIM Interface Modules are capable of storing 64,000 records of time-stamped data. The data log is a circular buffer with the oldest records being overwritten when the buffer is full. The most recent 1,000 records are stored in non-volatile memory (BBRAM).

If your EIM is equipped with the 512k BBRAM option, the data logger will perform as described above. However, the number of records stored in BBRAM increases to the 18,000 most recent records.

A station can be configured to store data from one, or all, of its input channels. Sampling rate is user-selectable for any period between once per 100mS and once every 24 hours. Follow the directions below to complete the data logger configuration.

Note:
Before configuring the data logger, ensure that you logon with the appropriate security rights. For information on security rights, see Appendix C.

1. From the Home Page of the NCS, select the *Configure Data Logger* option from the Data Logger menu.

2. In the *Channel Selection* area, choose the channels that you want to log. If you want to log more than one channel, hold the *Control* key down while selecting the multiple channels. Alternatively, you can use the *Shift* key to select a group of contiguous channels.

3. Next, specify the *Sample Rate* at which you want to log the selected channels.

4. In the *Maximum Records Per Channel* area, enter the number of records per channel you would like to log. If you are logging two channels and you entered a value of 25, your data log file will contain a total of 50 records.

5. Select how you would like the data logger to react if power is lost to the NCS. Upon power recovery, the data logging can be re-started or prevented from starting. Upon restart, data is appended to the previous data log as long as the configuration has not been updated.

Note:
Only data logged in battery-backed RAM (the most recent records) will remain following power loss. If the data logger is configured to start on power recovery, or if it is manually started, new data is appended to data present in the log.

6. After reviewing your configuration, click the *Update* button to commit the data logger configuration.

Caution:
Once the data logger is configured, clicking Update will delete all previously logged data. A dialog box appears verifying that you want to proceed.

7. Finally, click the *Start* button to start the data logger.

You can view the recorded data while the logger is running by clicking the *View Data Log* button from the *Data Logger* menu. To retrieve the data log as a text file, you must first stop the data logger (from within the *Configure Data Logger* option in the *Data Logger* menu). For instructions on retrieving the data log as a file, refer to the next section (*Accessing a Data Logger File)* of this manual.

You can view status of the data logger, whether it is running or not, and the number of records in the log, by clicking *View Logger Status* from the *Data Logger* menu.

Note:
Files cannot be downloaded or accessed while the data logger is writing to them.

Accessing a Data Logger File

The EIM's Data Logger saves data in text format. To access this file, follow the instructions below.

Note:
Before attempting to retrieve the data log as a file, ensure that you logon with the appropriate security rights. For information on security rights, refer to Appendix C.

1. Select the *Configure Data Logger* option from the *Data Logger* menu.

2. If the data logger is running, stop it by clicking the *Stop* button.

Note:
The data logger must be stopped in order to retrieve the data log as a file.

3. Click the *Save Data Log Locally* hyperlink.

4. At the *File Download* box, select whether to Open or Save the file to another location.

5. The spreadsheet opens as a .csv file in Microsoft Excel®, you are able to make any modifications or changes that you require.

If you select to Open the spreadsheet directly from the webpage and make any changes to data, you will need to perform a *Save As* function in order to save the information. Therefore, you will need to assign a file name and location for the modified spreadsheet on your local PC or network.

If you choose to *Save* the file when opening, you may make whatever changes are needed and save them directly to the file in its present location.

No changes that you make will be saved directly to the EIM's data logger.

6. Saving the spreadsheet to a different location brings you back to the webpage once downloading has completed.

If you selected to Open the file, you may use the *Go To* drop down menu to navigate back to the desired page.

Figure A-1. *Data Logger Sample Data*

	A	B	C	D	E	F	G
1	Record Ind	Log Date	Log Time	Device	Channel	Value	Tag
2	1	21-Mar-06	17:46:34	1	1	-2.5E-05	Mod. 1 Ch. 1
3	2	21-Mar-06	17:46:34	1	1	-2.5E-05	Mod. 1 Ch. 1
4	3	21-Mar-06	17:46:34	1	1	-2.5E-05	Mod. 1 Ch. 1
5	4	21-Mar-06	17:46:34	1	1	-3.7E-05	Mod. 1 Ch. 1
6	5	21-Mar-06	17:46:35	1	1	-3.7E-05	Mod. 1 Ch. 1
7	6	21-Mar-06	17:46:35	1	1	-7.4E-05	Mod. 1 Ch. 1
8	7	21-Mar-06	17:46:35	1	1	-7.4E-05	Mod. 1 Ch. 1
9	8	21-Mar-06	17:46:35	1	1	-7.4E-05	Mod. 1 Ch. 1
10	9	21-Mar-06	17:46:35	1	1	-8.6E-05	Mod. 1 Ch. 1
11	10	21-Mar-06	17:46:35	1	1	-8.6E-05	Mod. 1 Ch. 1
12	11	21-Mar-06	17:46:35	1	1	-7.4E-05	Mod. 1 Ch. 1
13	12	21-Mar-06	17:46:35	1	1	-7.4E-05	Mod. 1 Ch. 1
14	13	21-Mar-06	17:46:35	1	1	-6.2E-05	Mod. 1 Ch. 1
15	14	21-Mar-06	17:46:35	1	1	-6.2E-05	Mod. 1 Ch. 1
16	15	21-Mar-06	17:46:36	1	1	-1.2E-05	Mod. 1 Ch. 1
17	16	21-Mar-06	17:46:36	1	1	-1.2E-05	Mod. 1 Ch. 1
18	17	21-Mar-06	17:46:36	1	1	-2.5E-05	Mod. 1 Ch. 1
19	18	21-Mar-06	17:46:36	1	1	-2.5E-05	Mod. 1 Ch. 1
20	19	21-Mar-06	17:46:36	1	1	-4.9E-05	Mod. 1 Ch. 1
21	20	21-Mar-06	17:46:36	1	1	-4.9E-05	Mod. 1 Ch. 1
22	21	21-Mar-06	17:46:36	1	1	-7.4E-05	Mod. 1 Ch. 1
23	22	21-Mar-06	17:46:36	1	1	-7.4E-05	Mod. 1 Ch. 1
24	23	21-Mar-06	17:46:36	1	1	-4.9E-05	Mod. 1 Ch. 1
25	24	21-Mar-06	17:46:36	1	1	-7.4E-05	Mod. 1 Ch. 1
26	25	21-Mar-06	17:46:37	1	1	-7.4E-05	Mod. 1 Ch. 1
27	26	21-Mar-06	17:46:37	1	1	-3.7E-05	Mod. 1 Ch. 1
28	27	21-Mar-06	17:46:37	1	1	-3.7E-05	Mod. 1 Ch. 1
29	28	21-Mar-06	17:46:37	1	1	-1.2E-05	Mod. 1 Ch. 1
30	29	21-Mar-06	17:46:37	1	1	-1.2E-05	Mod. 1 Ch. 1
31	30	21-Mar-06	17:46:37	1	1	-2.5E-05	Mod. 1 Ch. 1
32	31	21-Mar-06	17:46:37	1	1	-2.5E-05	Mod. 1 Ch. 1

EIMDataLog
Ready

Appendix B: Upgrading Interface Module Firmware and Web Pages

As more options become available for the Interface Module, you may want to upgrade the Web Server. Follow the instructions below to perform this function.

In order to acquire the latest upgrade files contact the factory. Generally these files are sent via email in a .zip file that you may use to install and upgrade your system.

Table A-1. *Necessary Equipment for EIM Server Upgrade*

Device	Description
FTP Communication Software	FTP client
Installed EIM Server	See *Connecting the EIM*
MII Web Page Files	Contact MII for more information
EIM Administrator-Level Username & Password	Default username is *Root* and password is *Password*

Caution:
Ensure that you are upgrading a version of the EIM that is still supported by Moore Industries. Refer to the section below for information on how to determine the version of your EIM.

How to Determine the Version of your EIM

From the web page menu bar, select the *Interface Module* drop down menu; choose *System Information.*

In the *Server Identification* section of that page, refer to the *Firmware Version* line. Perform the upgrade on units displaying firmware version 2.36.3 or greater. Units equipped with earlier firmware verisons are not supported for firmware upgrades.

It is recommended that you disconnect your EIM from the LAN and use a crossover cat 5 cable to connect directly to the unit and then perform the upgrade. However, if this is not easily done, the information below can also be applied to upgrading while the EIM is still connected to your network.

1. Verify that the Interface Module is attached to the network and is operational. You will need to know the IP address of the server. For installation instructions, please consult the *Connecting the EIM to the Network* section of this manual.

Note:
The following information applies to systems using a Windows® operating system newer than Windows 98 and Internet Explorer 5.5 and above. If you are running a system with earlier software, consult the factory for assistance.

2. In your browser's URL bar, type *ftp://* and the address of your EIM.

3. If a User name and/or Password are requested in the following window, enter the sufficient information. The EIM directory folders will appear.

4. Open the EIM's *www* directory folder. Then, open the *Edit* drop down menu located in the menu bar and choose *Select All* to select all of the existing files. Delete all files.

5. Access the .zip file that was sent to you containing the upgrade files (extract the files if you have not already). Open the *www* folder in that. Again, open the *Edit* drop down menu and choose *Select All*. Once, all files are highlighted, right-click and select *Copy*.

6. Return to the FTP site and open the EIM's *www* folder. This directory should now be empty as its files were deleted in Step 4 (if files that you are certain were deleted still appear, hit the F5 keyboard button; this will refresh your screen). Open the *Edit* drop down menu, then select *Paste*. The new files will now be copied into the folder.

7. After the files have finished uploading, find the .dlb file that you extracted from the .zip file. Once you have located the file, select it, right-click and select *Copy*.

8. The .dlb file needs to be copied into the EIM's *update* directory. Open the *update* folder. The folder should contain no files. Right-click anywhere in the folder and select *Paste*. This will copy the new firmware to the EIM's flash memory.

9. Once the file has finished uploading, close your FTP site. You have now completed the upgrade. The NCS will re-boot itself in approximately 45 seconds. It will restart in about three minutes.

CAUTION:

During the upgrade process, do not remove or disturb power to the Interface Module server. Removing power during the upgrade will corrupt the Interface Module's memory and the server will not boot up.

Appendix C: NCS Security Overview

The Security page of the NCS web server allows an administrator to determine which users are allowed access to which portions of the NCS configuration software. There are three different user types; each user type has different security restrictions.

Administrator
The administrator is allowed read and write access to all pages.

Power User
The power user can read and write all pages except the security pages. (Although he is allowed to change his own password on the security page.)

Guest
A guest has no write privileges, but can read any pages except the security pages. The guest also cannot upgrade firmware, access or update saved configuration files or change his or her password.

Changing the Security Settings

To add or edit user accounts, the Interface Module must be in closed security mode and you must log in with an administrative password. The default security mode is open, so first click on *Security*, then *Security Mode* and set it to closed. Finally, log out.

Log on using an administrative account. The default administrator account is *root* with a password of *password*. When the NCS Home Page is displayed, click on *Security*, then any of the options you wish to change. Log out when you are finished.

Resetting Interface Module Passwords

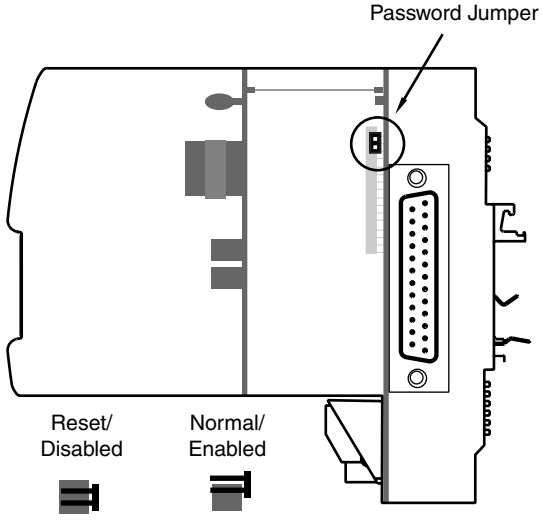
The Password function is a valuable security tool, but can be troublesome when the password is lost, forgotten, or erroneously set. If you cannot access the Interface Module's web server because of a missing password, there are two options.

First, try to log on using the default administrator username of *root* with the password of *password*. This may have already been replaced by your current administrator password. If that is the case, you will need to reset the passwords using the following steps.

Note:
All previously setup user accounts will be deleted when you reset the password jumper.

1. Remove power cables from the Interface Module to power down the unit.
2. Remove the right side panel (as viewed from the front of the unit) from the Interface Module by removing the side panel screws.
3. Place the password jumper on both pins as illustrated in Figure A-2 under the *Passwords Reset/Disabled* illustration, and power up the Interface Module.
4. Power down the Interface Module and remove the password jumper, placing it back on the jumper as shown in the *Passwords Normal/Enabled* illustration. Replace the side panel, and power up the module. It is now ready for use.
5. Start the Web Server, and use the administrative account with a username of *root* and a password of *password*, to access the system and make any necessary changes. A guest account with the username of *guest* and a password of *password* is also available for use.

Figure A-2. *Password Jumper Location*



Appendix D: MODBUS/TCP Support

Each NCS Interface Module is designed to be accessed using either a supplied OPC server or MODBUS communication. Directions for connecting to the OPC server can be found in the installation section for your Interface Module. The section below supplies all of the information necessary to reference the Modbus register map and program a generic MODBUS/TCP OPC server, or other MODBUS/TCP master.

MODBUS/TCP is supported according to the document, *Open Modbus/TCP Specification*, release 1.0, 29March1999, Schneider Electric. The MODBUS registers allow access to process variable data and status information. See Table A-2 for a complete list of available MODBUS Registers.

Reading Primary Variables
Process variables are read using MODBUS function code 3 or 4. Each 32-bit floating-point process variable will be mapped to two MODBUS registers; the lower numbered MODBUS register will hold the least-significant-word (LSW), and the higher numbered MODBUS register will hold the most-significant-word (MSW) of the 32-bit value. For MODBUS clients that support swapped floating point, the NCS demo provides a setting to change the default word order using the *MODBUS Properties* page of the web server.

Reading Device Status
Diagnostic data is read using MODBUS function codes 1 to 4. Each 16-bit status register will be one MODBUS integer register, accessible using function codes 3 or 4. When using function codes 1 or 2, the 16 status register bits are mapped to 16 consecutive cells, with the status register's least-significant-bit in the lowest addressed cell.

Communicating with NET Concentrator Modules
At startup, the Interface Module will perform an initialization sequence to detect all connected NCS I/O modules. If it recognizes the connected device, it will mark the module as active in preparation for data scanning.

After detecting connected NCS modules, the Interface Module will begin continuous polling for the current process variable and status of each module. The returned data is stored locally by the inteface module for access by the web server or the MODBUS/TCP server. Interface modules continuously poll all connected I/O modules.

Table A-2. *MODBUS Register Definitions*

Variable Name	Register Reference	Number of MODBUS Registers	Function Code	Data Type
Primary Variable	1 + 8(M – 1) + 2(C – 1)	2	3, 4, 6, or 16	Float
Ambient Temperature	201 + 8(M – 1) + 2(C – 1)	2	3, 4, 6, or 16	Integer
Interface Module Status Register	2000	1	3 or 4	Integer
Interface Module Status Flags	2000 + B	1	1 or 2	Discrete
Base Fail Register	2001	1	3 or 4	Integer
Module Fail Register	2002	1	3 or 4	Integer
Base Fail Flags	2015 + M	1	1 or 2	Discrete
Module Fail Flags	2031 + M	1	1 or 2	Discrete
Channel Status Register	2002 + 4(M – 1) + C	1	3 or 4	Integer
Channel Status Flags	2048 + 64(M – 1) + 16(C – 1) + B	1	1 or 2	Discrete
Discrete Primary Variable	8(M – 1) + C	1	1-6, 15 or 16*	Discrete
Discrete Module Status Register	2003 + 4(M – 1)	1	3 or 4	Integer
Discrete Module Status Flags	2048 + 64(M – 1) + B	1	1 or 2	Discrete
System Time Status Register	4002	1	3 or 4	Integer
System Time Status Flags	4017 + B	1	1 or 2	Discrete
ISaGRAF Status Register	4001	1	3 or 4	Integer
ISaGRAF Status Flags	4001 + B	1	1 or 2	Discrete

In Register Reference**:**
M represents module position (1-8);
C represents channel number (1-4);
B represents bit position (0-15) within the Interface Module's register.

*When using function codes 3, 4, 6, or 16, one discrete primary variable is delivered per MODBUS register, with a non-zero integer value representing logic 1.

NET Concentrator Status Registers

The contents of the status registers are defined in Tables A-3 through A-9. Each bit in a status register is a status flag. An error is indicated by a set bit or any combination of set bits.

Table A-3. *Interface Module Status Register*

Bit Position	Description
15	Not used
14	An ISaGRAF error has occurred (see ISaGRAF Status Register for details).
13	Not used
12	Not used
11	The file system is full.
10	Data Logger failed to restore records from non-volatile RAM.
9	The data logger could not be initialized.
8	Indicates a failure to start one or more of the network services.
7	Indicates a failure in the I/O module port.
6	Missing or corrupted password file or password jumper was detected. Default password file loaded.
5	A system time error has occurred (see System Time Status Register for details).
4	Missing system configuration file.
3	New file system. Indicates that the EIM has formatted the file system. Normally, this is only performed once at the initial system startup. However, an automatic format can occur if the file system becomes corrupted.
2	File system initialization error. Indicates that the EIM cannot determine the state of the file system. Depending on the type of error, the EIM may attempt to automatically format the file system.
1	RAM test failed. This bit is set when a read/write error occurs during the power-on RAM test.
0	Slave device error. Indicates an error in an attached I/O module (see Channel Status Registers for details).

Table A-4. *System Time Status Register*

Bit Position	Description
4	System time has been set to default.
3	System timed out waiting for response from time server.
2	Could not resolve time server host name.
1	SNTP system communications error.
0	Clock battery failed, or clock mode failed (replace the clock battery or the clock module).

Table A-5. *ISaGRAF Status Register*

Bit Position	Description
6	One or more resources failed to write data.
5	One or more resources failed to restore retained data.
4	I/O Wiring module type mismatch.
0	ISaGRAF has caused a system fault.

Table A-6. *TIM Channel Status Register/Bit Positions*

Bit Position	Description
11	Run-time Failure
10	EEPROM Failure
9	A/D Converter Failure
8	Broken RJC
7	Broken Wire #4
6	Broken Wire #3
5	Broken Wire #2
4	Broken Wire #1
3	Analog Input A/D Saturated
2	Input Signal out of Linearized Range
1	Channel not Used
0	I/O Channel Fail

Table A-7. *AIM Channel Status Register/Bit Positions*

Bit Position	Description
11	Run-time Failure
10	EEPROM Failure
9	A/D Converter Failure
3	Analog Input #1 A/D Saturated or Analog Input #2 A/D Saturated
2	Input signal of RTD/TC linearization table range or Input/Trimmed value out of custom table range
1	Channel not used
0	I/O channel failure

Table A-8. *AOM Channel Status Register/Bit Positions*

Bit Position	Description
9	PV is too large
8	PV is too small
7	PV is invalid floating-point value
6	Low current error
5	Front-end reset occurred
4	FLASH failure
3	SRAM failure
2	EEPROM failure
1	Channel not used
0	I/O channel failure

Table A-9. *DIM and ROM Channel Status Registers/Bit Positions*

Bit Position	Description
6	LED Port Error
5	Front-end reset occurred
4	FLASH failure
3	SRAM failure
2	EEPROM failure
1	Channel not used
0	I/O channel failure

Appendix E: Loading a Custom Curve File

There are two ways in which a custom curve can be loaded into the EIM for use with the TIM or AIM configuration pages. In order to create a Comma Separated Value (.csv) file, you will need either Microsoft Excel® or other similar spreadsheet program, (refer to Figure A-3) or a text editor (refer to Figure A-4).

1. In Microsoft Excel®, open a new sheet. Using column A as your X data, and column B as your Y data observe the following scheme:

Column A: The X data must be a monotonically increasing sequence (i.e. each value must be greater than the previous value in the sequence).

Column B: The Y data may be any sequence. You may enter up to 128 X,Y pairs. All numbers must be real, signed numbers, up to 6 digits long (7 digits and higher must be translated to exponential notation) or 6 plus one decimal point. Exponent notation (in the form of 1e+010, rather than 10e9) may also be used, but it will be translated to the full value (i.e. 10e9 = 10000000000) and thus must not represent a number higher than Xe37. Numbers represented as Xe38 and above will produce errors.

After entering your values, simply save as a .csv file.

2. Observing the same rules, you can also use a text editor to create your .csv file in the following manner:

The file must be saved with a .csv extention. The .csv file is then transferred to the EIM *cfg* directory via the FTP site (refer to *Appendix B: Upgrading Interface Module Firmware and Web Pages* for instructions regarding access of the FTP site).

To configure the TIM or AIM with the custom curve, perform the following:

1. From the configuration page for the channel requiring the custom curve, click *Load .csv*.

2. The *Load Custom Curve* window will appear. Select the file you created from the list and click *Load*.

3. The *Load Custom Curve* window will disappear. Check the *Enabled* box in the Custom Curve section of the configuration page and click *Commit*.

Figure A-3. *Comma Separated Value file (Microsoft Excel® Spreadsheet)*

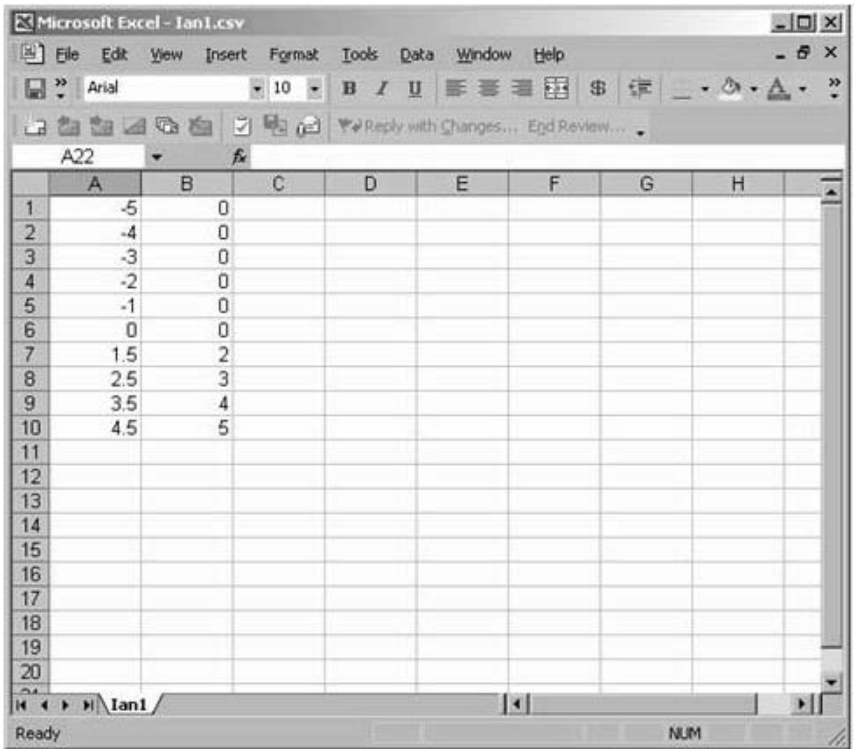
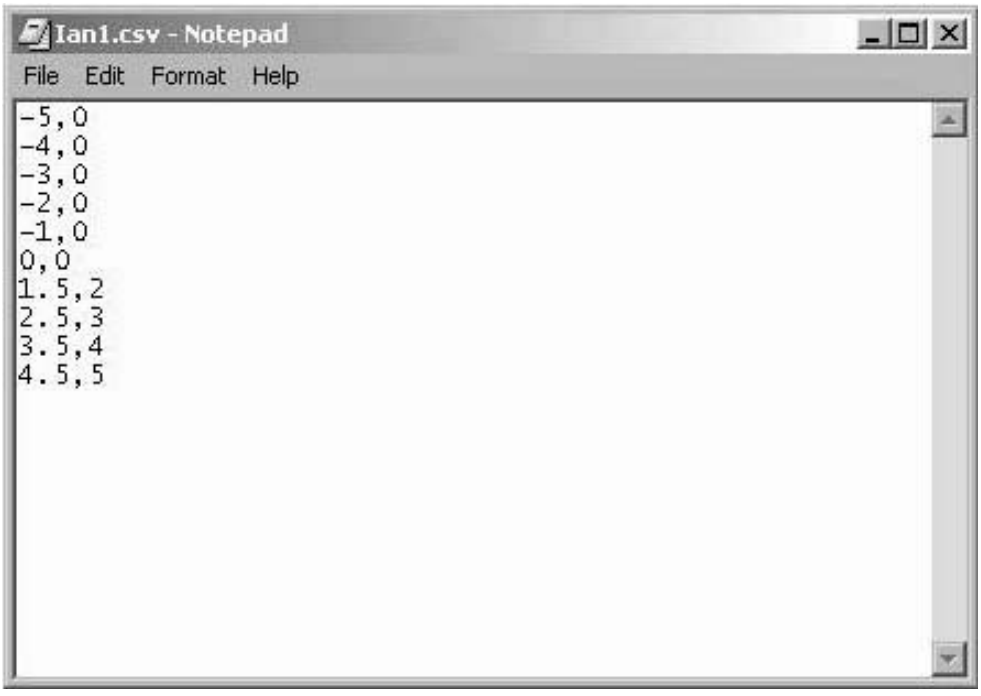


Figure A-4. *Comma Separated Value file (text editor)*



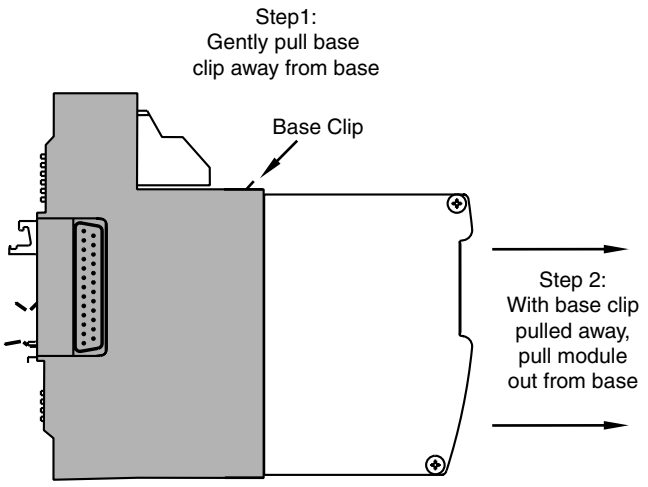
Appendix F: Hot-Swapping a NET Concentrator® Module

Should an Input/Output Module need to be replaced, you do not need to power down the NET Concentrator System. Instead, simply remove the old module from the terminal base, and snap in the new one.

Programming a New Module
The NCS uses the configuration present in the new module. If the new module has the same configuration as the one being replaced, nothing else needs to be done. If not, the new module must be programmed using the directions in the configuration section of the manual that applies to the module being installed.

Removing the Old Module
Begin by taking a small flathead screwdrivers and inserting it under the base clip, as shown in Figure A-5. With the base clip pulled away, pull the module out from the base.

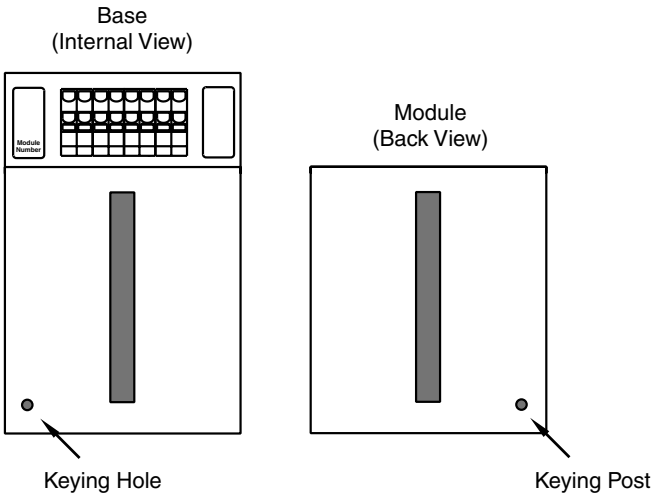
Figure A-5. *Removing the Old NCS Module*



Snapping in the New Module
Check to see that the keying post (shown in Figure A-6) will line up properly with the keying hole in the bottom of the module. If it does not, rotate the module 180°. If it still does not line up, the module is of the wrong I/O type. The new module must be of the same type as the previous module.

Slip the new module into the base that the old one was removed from. Push firmly into position. The lights on the face of the input/output module should glow as the unit powers up. Your new NCS module is now in service.

Figure A-6. *Snapping in the New NCS Module*



Note:
A new NCS module will only work with an identical type of base. For example, you cannot place an AIM module into a base that previously held a TIM; the new module must replace an identical older module.

Appendix G: File Management

This section describes the File Management capability which enables you to save, and apply, saved configurations to numeorus units.

To Save a File

Set the parameters you wish to save as a file and click *Commit.* Once you have done this, click the *Save File* button and assign a name to the file. In the window that appears, click the *Save* button.

To Load a File

To retrieve or reapply a saved configuration, click the *Load File* button and select the correct file name. In the window that appears, click the *Load* button.

Deleting Saved Configurations

To delete a previously saved configuration, access your system's FTP site. Open the *cfg* folder and then select, and delete, the files you no longer need. Refer to *Appendix C* for instruction regarding access of the assosciated FTP site.

Customer Service

If service assistance is ever required for one of the NET Concentrator Modules in your application, refer to the back cover of this manual for the telephone numbers to Moore Industries STAR Center customer service department.

If possible, make a note of the model number of the offending module before calling. For fastest assistance, try to gather information on the unit(s) serial number and the job and purchase order number under which it was shipped.

Declaration of Conformity

EMC Directive 89/336/EEC

- **Manufacturer's Name:** Moore Industries-International, Inc.
- **Manufacturer's Address:** 16650 Schoenborn Street
  North Hills, CA 91343-6196
  USA

Declares that the product(s):

- **Product Name:** AIM, AOM, CPM, DIM, EIM, ROM, TIM

- **Model Number(s):**

MODEL /	INPUT /	OUTPUT /	POWER /	OPTIONS /	HOUSING
AIM	*	*	*	*	*
AOM	*	*	*	*	*
CPM	*	*	*	*	*
DIM	*	*	*	*	*
EIM	*	*	*	*	*
ROM	*	*	*	*	*
TIM	*	*	*	*	*

* Indicates any input, output, power, option and housing as listed on the product data sheet

- **Conforms to the following EMC specifications:**
  EN 61326-1, 1998, Electromagnetic Compliance (EMC) requirements for electrical equipment for control use

- **Supplementary Information:**
  None

13 June 2003
Date

Fred Adt
Quality Assurance Director

Robert Stockham
Moore Industries-Europe General Mgr.

European Contact: Your Local Moore Industries Sales and Service Office

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RETURN PROCEDURES

To return equipment to Moore Industries for repair, follow these four steps:

1. Call Moore Industries and request a Returned Material Authorization (RMA) number.

   Warranty Repair –
   If you are unsure if your unit is still under warranty, we can use the unit's serial number to verify the warranty status for you over the phone. Be sure to include the RMA number on all documentation.

   Non-Warranty Repair –
   If your unit is out of warranty, be prepared to give us a Purchase Order number when you call. In most cases, we will be able to quote you the repair costs at that time. The repair price you are quoted will be a "Not To Exceed" price, which means that the actual repair costs may be less than the quote. Be sure to include the RMA number on all documentation.

2. Provide us with the following documentation:
   a) A note listing the symptoms that indicate the unit needs repair
   b) Complete shipping information for return of the equipment after repair
   c) The name and phone number of the person to contact if questions arise at the factory

3. Use sufficient packing material and carefully pack the equipment in a sturdy shipping container.

4. Ship the equipment to the Moore Industries location nearest you.

The returned equipment will be inspected and tested at the factory. A Moore Industries representative will contact the person designated on your documentation if more information is needed. The repaired equipment, or its replacement, will be returned to you in accordance with the shipping instructions furnished in your documentation.

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ANY BUYER OF GOODS OR SERVICES FROM THE COMPANY AGREES WITH THE COMPANY THAT THE SOLE AND EXCLUSIVE REMEDIES FOR BREACH OF ANY WARRANTY CONCERNING THE GOODS OR SERVICES SHALL BE FOR THE COMPANY, AT ITS OPTION, TO REPAIR OR REPLACE THE GOODS OR SERVICES OR REFUND THE PURCHASE PRICE. THE COMPANY SHALL IN NO EVENT BE LIABLE FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES EVEN IF THE COMPANY FAILS IN ANY ATTEMPT TO REMEDY DEFECTS IN THE GOODS OR SERVICES , BUT IN SUCH CASE THE BUYER SHALL BE ENTITLED TO NO MORE THAN A REFUND OF ALL MONIES PAID TO THE COMPANY BY THE BUYER FOR PURCHASE OF THE GOODS OR SERVICES.

ANY CAUSE OF ACTION FOR BREACH OF ANY WARRANTY BY THE COMPANY SHALL BE BARRED UNLESS THE COMPANY RECEIVES FROM THE BUYER A WRITTEN NOTICE OF THE ALLEGED DEFECT OR BREACH WITHIN TEN DAYS FROM THE EARLIEST DATE ON WHICH THE BUYER COULD REASONABLY HAVE DISCOVERED THE ALLEGED DEFECT OR BREACH, AND NO ACTION FOR THE BREACH OF ANY WARRANTY SHALL BE COMMENCED BY THE BUYER ANY LATER THAN TWELVE MONTHS FROM THE EARLIEST DATE ON WHICH THE BUYER COULD REASONABLY HAVE DISCOVERED THE ALLEGED DEFECT OR BREACH.

RETURN POLICY

For a period of thirty-six (36) months from the date of shipment, and under normal conditions of use and service, Moore Industries ("The Company") will at its option replace, repair or refund the purchase price for any of its manufactured products found, upon return to the Company (transportation charges prepaid and otherwise in accordance with the return procedures established by The Company), to be defective in material or workmanship. This policy extends to the original Buyer only and not to Buyer's customers or the users of Buyer's products, unless Buyer is an engineering contractor in which case the policy shall extend to Buyer's immediate customer only. This policy shall not apply if the product has been subject to alteration, misuse, accident, neglect or improper application, installation, or operation. THE COMPANY SHALL IN NO EVENT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.

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Specifications and Information subject to change without notice.

May 2007

The following information applies to the *MODBUS Register Definitons* table (Table A-2, Page 50) of the NCS[EIM] NET Concentrator® System with Ethernet Interface Module User's Manual, 288-701-00, Revision C. The shown variables were omitted from the manual at the time of issue.

Variable Name	Register Reference	Number of MODBUS Registers	Function Code	Data
Serial Number (upper)	1900	1	3 or 4	Integer
Serial Number (lower)	1901	1	3 or 4	Integer
Version major	1902	1	3 or 4	Integer
Version minor	1903	1	3 or 4	Integer
Version build	1904	1	3 or 4	Integer
Year	1905	1	3 or 4	Integer
Month	1906	1	3 or 4	Integer
Date	1907	1	3 or 4	Integer
Hour	1908	1	3 or 4	Integer
Minute	1909	1	3 or 4	Integer
Second	1910	1	3 or 4	Integer
Milliseconds	1911	1	3 or 4	Integer

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